DECEMBER 17, 1984
CHEMICAL & ENGINEERING

NEWS

Fiber intermediates output stymied by apparel imports Page 13

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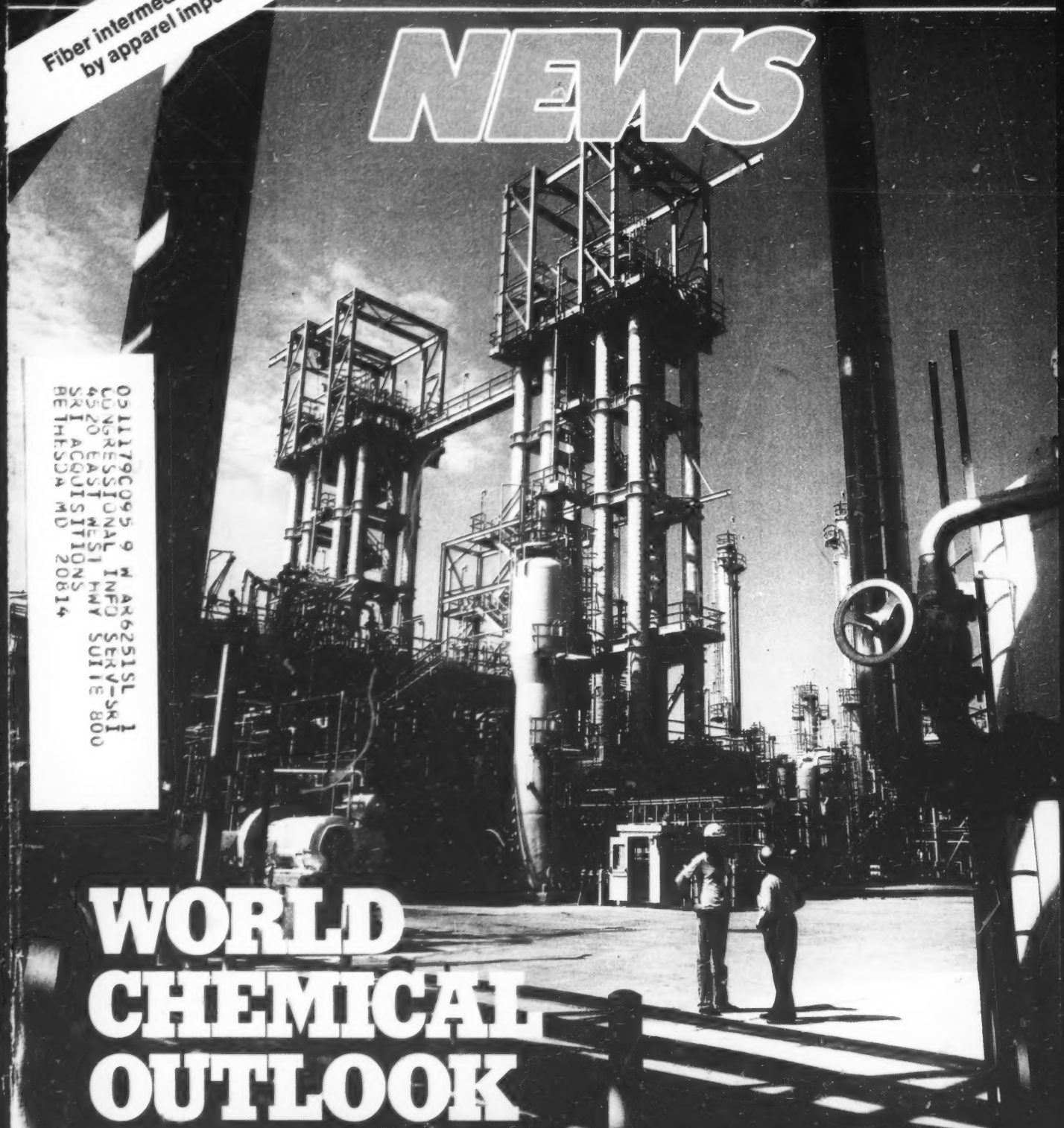

WORLD CHEMICAL OUTLOOK

Page 32

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News of the Week

■ **Many questions concerning the tragedy at Bhopal remain: how the accident happened, how survivors will be compensated.** **Page 6**

■ **Operations at Institute, W.Va., methyl isocyanate plant shut down for safety checks; attempts made to reassure local residents.** **Page 7**

■ **Carbide stock price fell steeply in week following the accident; investors are concerned that damage payments will not be fully covered by insurance.** **Page 7**

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Business

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Biotechnology firms enjoyed higher revenues in the third quarter but costs of operating, R&D, and marketing also rose. **Page 17**

Government

Conservative Heritage Foundation report urges upgrading weapons programs, Star Wars system in future science policy. **Page 20**

Nine-member bipartisan commission to be set up to examine need for chemical arms, binary weapons in particular. **Page 22**

Federal research and development activities are not expected to suffer unduly from proposed Administration budget cuts. **Page 23**

NAS's Board on Chemical Sciences & Technology will advise Army on defensive aspects of chemical and biological warfare. **Page 23**

Technology

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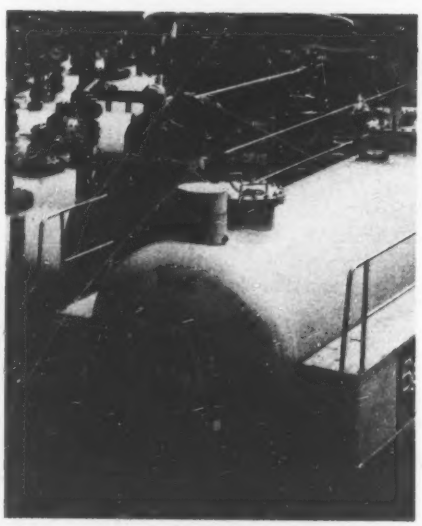
^{34}S-enriched sulfur produced at Oak Ridge by gas centrifugation; GE synthesizes the first gem-quality jadeite. **Page 28**



Special Report

1984 was generally a good year for the chemical industry worldwide but prospects for 1985 are mixed. **Page 32**

Apparel Imports Slow Fiber Intermediates Demand

Rising imports coupled with fall in export markets for fibers are hurting major intermediates DMT/PTA, ethylene oxide, cyclohexane

Bruce F. Greek, C&EN Houston

Changes being wrought in textile trade are playing havoc with the U.S. synthetic fibers industry. At the heart of these changes are a fast-rising tide of imported apparel and a decline in export markets for fibers and fiber precursors made in the U.S. But the impact of these changes extends to the chemical producers who make such fiber intermediates as dimethyl terephthalate/purified terephthalic acid (DMT/PTA), ethylene oxide, and cyclohexane.

The immediate impact on these intermediates, which are used to make nylon and polyester, is stagnating demand. As a result, production is declining to the point that recovery from the recent recession has been interrupted. Of the three intermediates, only ethylene oxide is likely to top its prerecession high in production this year. And for next year, production of all three is expected to hover near that of 1984.

Longer term, there may be some hope in the form of import controls, but the outlook is far from clear. Indeed, there's no consensus that efforts to reduce imports of apparel would be successful in alleviating the problem of depressed demand in the long term. If it should turn out that import controls in any form cannot do the job, then production of these fiber intermediates could enter a long-term decline with the usual profit drops and losses before production units are shut down. On the other hand, if import controls were to stem apparel imports, then production of the fiber intermediates could increase in tandem with growth in domestic fiber demand, as normally influenced by such factors as fashion and population.

Key Chemicals

The outlook for the three major fiber intermediates goes beyond just textile and apparel, for their derivative fibers go into many other products as well. Carpets dominate the fibers' other uses, and for the longer term, fiber production depends partially on demand for carpets, which, in turn, is influenced by home building, home sales, and commercial space leasing. These markets are heavily influenced by the economy and interest rates.

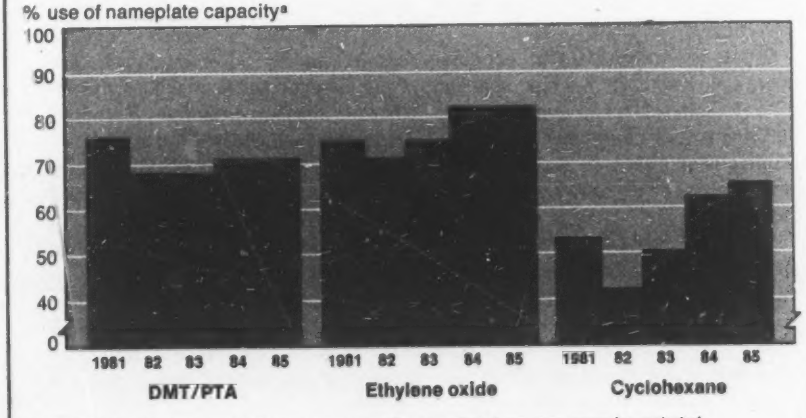
Although fibers for apparel and carpets dominate the uses of the three fiber intermediates, each of these materials has other uses. With the exception of antifreeze, polyester bottles, and solvents, none of these other uses are very large. And with the possible exception of bottles, none will grow much during the rest of the 1980s.

With the slowing demand for the fiber intermediates, capacity, too, likely will decline. Indeed, within the next five years, the number of producers of ethylene oxide and cyclohexane is expected to shrink, because chances of restarting now shut-down plants and of regaining good profitability from operating others will be slim owing to the very slow growth for their products.

So fiber intermediates producers may be set to enter 1985 with a certain amount of apprehension. The new year may see nearly all fiber-related growth disappear, with many producers' hopes tied to a political uncertainty called import controls.

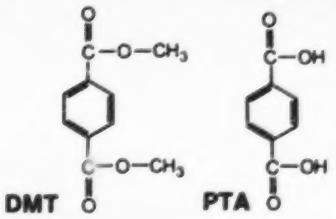
For more details on the outlook for these fiber materials, see the following pages.

Capacity use of cyclohexane plants continues to move up



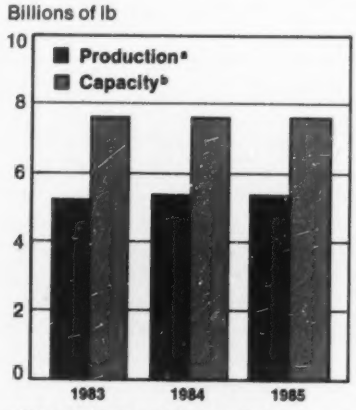
[a] Capacity may be overstated because some capacity now shut down may never be restarted.
Sources: Industry and C&EN estimates, International Trade Commission

DMT/PTA



- **Demand growth stopped**
- **Capacity on hold**
- **Prices discounted**

PRODUCTION/CAPACITY



a DMT and DMT equivalents of PTA (1.0 lb of PTA = 1.17 lb of DMT). b First quarter.

MAJOR PRODUCERS

Amoco Chemicals, Du Pont, Eastman Chemical, Hercofina

HOW MADE

Oxidation of p*-xylene and concurrent esterification with methanol to make DMT; oxidation of* p*-xylene to make PTA*

MAJOR DERIVATIVES (U.S.)

Polyethylene terephthalate 90%, polybutylene terephthalate 5%

MAJOR END USES (U.S.)

Polyester fibers 70%, films 10%

FOREIGN TRADE

Exports—may exceed 200 million lb in 1984, imports—negligible

PRICES

List prices about 35 cents a lb for DMT and 39 cents a lb for PTA

Dimethyl terephthalate (DMT) and purified terephthalic acid (PTA) have clearly lost their status as two of the premier growth products of the chemical industry. These products of the oxidation of *p*-xylene now have joined the growing group of chemicals afflicted with sizable overcapacity, slowing total exports, and softening domestic demand. Production in 1985 will do well just to match that of 1984: about 5.4 billion lb for DMT and PTA converted to DMT equivalents.

At 5.4 billion lb, this year's production will end up just 4% higher than the disappointing output of 5.2 billion lb in 1983. This less-than-forecast production growth in both 1983 and 1984 means that topping 1981's previous production high of 6.1 billion lb could remain several years away. Some industry sources even refuse to predict when former production highs will be matched, because the outlook for polyester fibers, films, and bottles is clouded by such uncertainties as the future level of apparel imports and the untested market potential of plastic half-liter soft drink, beer, and other beverage bottles.

With growth expectations for the polyester segment so uncertain, little new investment is going into production equipment. Other than for minor debottlenecking that will raise nameplate capacity no more than 1%, capacity to make DMT/PTA will remain at about 7.6 billion lb for at least several years to come.

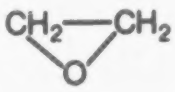
What this means is that capacity utilization rates likely will hold at about 67% for some time to come. At that utilization rate, operations are barely profitable—far less so than in 1981, when plants ran at 80% of nameplate capacity.

The forecast of continued low operating rates means that there will continue to be heavy pressure on prices in DMT/PTA's merchant market. Discounting of list prices apparently has increased some this year, partly because consumers know that the price of *p*-xylene has declined along with that of other petroleum products. DMT/PTA buyers want any savings passed along to them.

Almost all DMT/PTA goes into polyesters, predominantly polyester fibers. Thus, DMT/PTA's slow or even flat growth pattern ultimately stems from the slowdown in demand for U.S.-produced polyester fibers. That development, in turn, is the consequence of lower fiber export volume and a higher level of imports of garments made with polyester fibers. Aggravating the impact of the reduction in fiber exports is a drop in exports of polyester in chip form from which fibers are spun. As might be expected, the strong dollar is an incentive for foreign polyester chip producers to export their product to countries in which the garments eventually exported to the U.S. are made.

Compounding these problems, a secondary market for some forms of polyester fibers has begun to cut into primary production. One example is the recycling of polyester resin used in plastic bottles into filler material for insulated clothing and sleeping bags and for reinforcement in unsaturated polyester resin-fabricated products. Laws requiring a cash deposit on many beverage containers—so-called "bottle laws"—are being enacted in more and more states, increasing the incentive to recycle. As a result, more new, small companies are in the business of producing fiber materials from used bottles. So far, however, there is no clear quantitative estimate of the effect of recycling on primary polyester production and DMT/PTA demand.

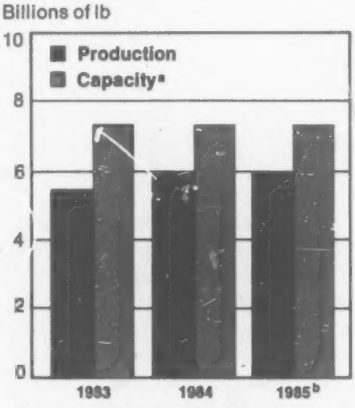
Even with some growth in demand for polyester fibers, film, and bottles in the U.S., the offsetting impact of such factors as apparel imports and plastic bottle recycling pushes forecasts of DMT/PTA down to new low levels. At best, assuming there is no serious recession, demand for DMT/PTA next year will just match demand in 1984.



Ethylene Oxide

- ***Demand on hold***
- ***Capacity declining***
- ***Prices down***

PRODUCTION/CAPACITY



a First quarter. b Some capacity down, may never be restarted.

MAJOR PRODUCERS

BASF Wyandotte, ICI Americas, Shell Chemical, Texaco Chemical, Union Carbide

HOW MADE

Vapor-phase oxidation of ethylene with air or oxygen

MAJOR DERIVATIVES (U.S.)

Ethylene glycol 60%, ethoxylates 10%, glycol ethers 5%

MAJOR END USES (U.S.)

Polyester fibers, films, and molded items 30%; antifreeze 25%

FOREIGN TRADE

Exports—small, probably less than 25 million lb for 1984, imports—probably less than 10 million lb for 1984

PRICES

For merchant sales less than 10% of total output, about 35 cents per lb

Demand for ethylene oxide is being undermined seriously by a flood of imports of finished products containing the materials that make up the chemical's most important end-use markets. Producers of ethylene glycol —by far the most important derivative of ethylene oxide—are seeing both domestic and overseas demand for its two chief consumers, polyester fibers and antifreeze, undercut by imports of polyester garments and foreign-made autos containing factory-installed antifreeze.

As would be expected, weakening demand has reduced capacity utilization rates and will continue to do so this year. Production in 1985 will do well to match that of 1984. Prices are under pressure, especially since ethylene prices remain soft.

If the economy continues to grow next year at the 1984 rate, 1985 production of ethylene oxide probably will total 6 billion lb, the same volume expected for 1984. Since some producers expect demand to decline in second-half 1985, however, some growth will be needed in the first six months to reach the 1984 level. Such a scenario would recapitulate 1984's pattern of production; output rose well in the first half of the year before apparently slumping, destroying chances for meeting optimistic forecasts made in the spring.

Ethylene oxide capacity may seem excessive if just the total is considered. However, nearly 1 billion lb of nameplate capacity probably will be shut down during most of 1985. Earlier this quarter, both Dow Chemical and Union Carbide disclosed that they will place ethylene oxide plants on standby. Whether those units are restarted will depend greatly on the overall economics of production and consumption ranging from ethylene feedstock costs to the level of competition with imported ethylene glycol and finished goods containing ethylene oxide derivatives.

With about 920 million lb of capacity down next year, the average operating rate could be a quite healthy 94% of the roughly 6.4 billion lb of nameplate capacity that actually will be running. Taking the total industry nameplate capacity of 7.3 billion lb, however, the rate falls to 82%. That is a clearer indication of the position in which ethylene oxide producers now find themselves. Moreover, that estimate of potential nameplate capacity could be understated, because some producers have slowly been debottlenecking plants and adding process improvements in an effort to increase profitability. The additional capacity probably does not exceed 3% more, however, so the industry total is 7.5 billion lb at most.

Good performance by ethylene glycol, which accounts for more than 60% of ethylene oxide consumption, remains the key to achieving these operating rates. Demand from each of ethylene glycol's three major uses—polyester fibers, antifreeze, and exports—is expected to decline from current levels because of foreign competition. Although other ethylene glycol uses—as a solvent and in deicing fluids, for instance—are affected little by the vagaries of international trade, their potential growth is considered small.

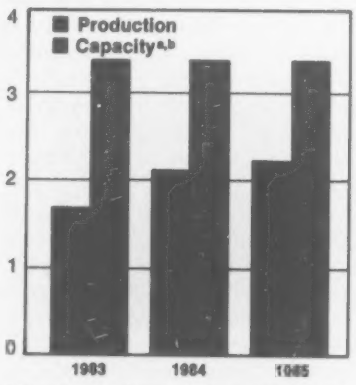
There is a wide spectrum of other end uses of ethylene oxide and its derivatives. One, glycol ethers, may lose its market in paints and other solvent applications to propylene oxide derivatives in coming years because of toxicity concerns. Other derivatives, such as ethanolamines and ethoxylates, eventually end up used in natural gas scrubbing and surfactants.

For ethylene oxide, the outlook over the near term seems to be for profitless, high operating rates as a result of reduced capacity. But 1985 also could be the year in which U.S. producers get a much better idea of how great an impact foreign competition will have on them. That would give some indication of what will happen in the future to domestic capacity that is still running.

Cyclohexane

- *Demand recovered*
- *Capacity may fall*
- *Prices down*

PRODUCTION/CAPACITY



a Some capacity down and may not restart. b First quarter.

MAJOR PRODUCERS

Du Pont, Gulf Oil Chemicals, Phillips Chemical, Texaco Chemical, Union Oil

HOW MADE

Catalytic hydrogenation of benzene; recovered from natural gasoline

MAJOR DERIVATIVES (U.S.)

Adipic acid 60%, caprolactam 30%

MAJOR END USES (U.S.)

Nylon 66 60%, nylon 6 30%

FOREIGN TRADE

Exports—rising, may reach 150 million lb in 1984, imports—very small, may reach 25 million lb in 1984

PRICES

List prices follow benzene prices closely; now at $1.28 per gal

Cyclohexane production this year has been rising and falling like a roller coaster. After a slow start in the first three months of 1984, output climbed fast in the second quarter, only to slow drastically in the third. This unusual variation in the production pattern was partly the consequence of changes in demand for nylons—which account for practically all of cyclohexane's end uses—and partly the consequence of plant problems experienced by some producers early in the year.

As a result, forecasting total production for the year is more or less guesswork. Probably, cyclohexane output will top 2 billion lb, possibly 2.1 billion lb. Although not a record by far, that total still would represent the best production year of the 1980s. Next year, if all goes reasonably well with the economy and interest rates hold or rise only modestly, a slight increase in production would bring the total to 2.2 billion lb.

The vagaries of 1984 production levels can be seen clearly in data reported by the U.S. International Trade Commission. Monthly output started at 140 million lb in January, rose to 181 million lb in February—despite 6% less production time—and then ballooned to 270 million lb in March. Because of plant problems, output fell off in April, and, in May, was back down under 160 million lb. By July, production had reascended to 236 million lb, before plunging again to 140 million lb and 145 million lb in August and September, respectively. Guesses are that in the fourth quarter output has been quite low, possibly at the lowest monthly levels of the year.

Cyclohexane producers have had no trouble handling demand at the peaks of their roller coaster ride, because there is plenty of excess capacity. Of the nameplate capacity available as 1984 began, nearly 10% was down temporarily, and during most of the year that fraction of capacity has not been running. During a siege of plant problems that began late in the first quarter, about half the remaining capacity was down for an average time of one month. Thus, total 1984 nameplate capacity for the cyclohexane industry includes more than 400 million lb that was not producing during the year—about an eighth of the total.

Even with an eighth of capacity inactive, cyclohexane producers still will operate their plants at no better than an average 70% of operable capacity for the year. Based on nameplate capacity, the average utilization rate falls to less than 62%. The erratic nature of the year shows up in monthly changes in utilization rates, however, ranging from more than 100% to less than 54% of active capacity.

Those wide swings in production and operating rates haven't affected prices significantly. The cyclohexane price is very closely tied to that of benzene, and consumers are quick to insist that a decline in the benzene price be passed on to them when it occurs. Because of the large average overcapacity for cyclohexane, producers have little leverage with which to loosen the connection to benzene pricing.

Demand for cyclohexane will closely track demand for apparel and carpet uses of nylon 66 and nylon 6. Since imports of both nylon fiber and apparel are rising rapidly, domestic fiber consumption will do little anytime soon to increase demand for U.S.-produced cyclohexane. The use of nylon as an engineering resin keeps growing faster than the gross national product, but volume is still too small to create sales that would significantly increase demand for cyclohexane. Cyclohexane's solvent and chemical intermediate uses are also small and not growing much.

During 1985, cyclohexane producers will continue to struggle with excess capacity while hoping that nylon will return to better times. A small production gain might occur, but it won't do anything for profitability.

Biotechnology revenues, costs surged in third quarter

David Webber, C&EN New York

Thanks to blossoming product sales in some cases, lucrative research contracts in others, and still-healthy interest income in nearly all, the revenues of biotechnology-based companies surged again in the third quarter. For a group of 14 companies representing a cross section of the biotechnology-based industry, composite revenues increased 99% following a 92% jump in the second quarter of the year.

At the same time, however, the size of the group's composite net loss for the quarter more than doubled to $9.3 million from $4.2 million in third-quarter 1983. This was primarily the consequence of sharply higher operating costs and expenses for research and development, manufacturing, marketing, and administration at many of the firms in the group.

Amgen, for example, spent 75% more during the six months ending Sept. 30, 1984, than in the same period last year, reflecting a higher rate of investment in new product and new process development, the company says. As a result, the six-month loss stretched from $2.5 million in 1983 to $4.1 million this year. At Biogen, expenses for the quarter jumped to $11 million from $7.8 million last year. At California Biotechnology, R&D costs grew 77% over the first nine months of 1984. At Damon Biotech, R&D spending increased 78% for the fiscal year ending Aug. 31. At Genentech, total costs and expenses rose 46% in the third quarter.

The rise in expenditures was not unexpected. Each firm in the group is spending substantial amounts of money to make the transition from research boutique to integrated manufacturing entity. There are a number of cash-consuming chores involved in effecting that change, ranging from bolstering marketing staff to building plants to carrying R&D costs alone—as opposed to sharing them with licensees—in order to retain sole rights to a product.

"This growth in research costs reflects increased commitments to our proprietary projects," notes California Biotechnololgy chairman Alfred G. Scheid in a typical explanation.

The effort to make this transition has created a requirement for extra delicacy in the management of each firm's financial resources. For a long time, many of the small biotechnology-based companies were able to leave relatively untouched the mounds of cash they amassed from stock issues, private equity sales, and other financial devices during the past several years. Having reached this stage in their evolution, however, many have now begun to dig into those mounds.

This has had a noticeable impact on the financial condition of some of the firms. Current ratios (the ratio of current assets to current liabilities: the higher the ratio, the stronger a company is judged in terms of its ability to meet its short-term obligations) are falling from the stratospheric heights of the past to more mundane levels. For example, in comparisons of the present value of the financial measurement to where it was at the beginning of 1984, Centocor's current ratio has fallen to 7.5 from 10.8; Genex's to 3.7 from 6.6; Hybritech's to 5.2 from 14.8; and Monoclonal Antibodies' to 2.3 from 15.6. Cetus' current ratio declined to 17.1 at the end of the third quarter from 25.8 at the end of the second quarter of 1984.

Scheid: growth in research costs

Gilbert: belt-tightening steps taken

For the most part, it is important to note, these measurements still indicate robust financial condition. The average current ratio for the chemical industry, by comparison, is typically around 2.0 (although it fell below that in 1982 and 1983). (As a rule of thumb, a ratio of 2.1 or greater is considered good for mature companies.) And in some cases, the financial condition of biotechnology-based firms has improved. Amgen's current ratio rose to 22.7 at the end of the third quarter from 19.1 at the end of the first quarter of the year, and Molecular Genetics' leaped to 48.0 from 12.8 at the beginning of 1984.

The difficult decisions involved in depleting those piles of cash and thus becoming financially more vulnerable are even more anxiety-making because the chances of many of the biotechnology-based companies finding ready financing, should the need arise in the near future, are considered much worse now than they were the first time these firms approached the investment community. For one thing, biotechnology stocks have almost uniformly declined in 1984. Some have reached all-time lows in recent months.

The difficult task of keeping the

Biotechnology revenues increased 99% in third-quarter 1984

	FIRST-QUARTER 1984[a]						NINE-MONTHS 1984[b]					
	Revenues[c]	Earnings[d]	Change from 1983		Profit margin[e]		Revenues[c]	Earnings[d]	Change from 1983		Profit margin[e]	
	($ millions)		Revenues	Earnings	1984	1983	($ millions)		Revenues	Earnings	1984	1983
Advanced Genetic Sciences	$ 0.02	$−1.68	−96%	def	def	def	$ 0.12	$−5.21	−93%	def	def	def
Amgen	2.55	−2.04	34	def	def	def	na	na	na	na	na	na
Applied Biosystems	6.83	1.22	110	160%	17.9%	14.4%	17.73	3.22	na	nm	18.2%	na
Biogen	8.19	−2.76	56	def	def	def	22.01	−10.92	48	def	def	def
California Biotechnology	2.04	−0.12	53	def	def	1.6	6.11	0.01	77	−91%	0.2	3.6%
Centocor	3.51	0.24	65	40	6.7	7.9	8.75	0.35	74	−51	4.0	14.2
Cetus	20.61	0.38	108	28	1.8	3.0	46.31	0.68	75	nm	1.5	def
Damon Biotech	1.04	−1.85	1	def	def	def	3.96	−2.51	84	def	def	def
Genentech	19.09	1.10	50	223	5.8	2.7	51.65	2.11	54	134	4.1	2.7
Genex	19.30	−3.20	537	def	def	def	33.53	−6.82	421	def	def	def
Hybritech	8.38	0.30	97	3	3.6	6.9	22.46	0.70	107	nm	3.1	def
Molecular Genetics	2.29	0.05	17	−79	2.3	12.9	7.12	0.01	43	−98	0.1	8.0
Monoclonal Antibodies	1.11	−0.85	242	def	def	def	2.93	−2.50	231	def	def	def
Ribi ImmunoChem	0.27	−0.05	54	def	def	def	0.75	−0.19	52	def	def	def

a For three-month period ending closest to Sept. 30. b For nine-month period ending closest to Sept. 30. c Includes sales, contract research, royalty, and interest revenues. d Excludes extraordinary credits. e After-tax income as a percentage of revenues. na = not available. nm = not meaningful. def = deficit.

expense of the transition to manufacturing company in line with resources already is beginning to force retrenchment of one sort or another at a number of biotechnology-based firms. For instance, earlier this month Genex decided to eliminate 54 research and administrative positions, or about 16% of its total workforce. The Rockville, Md., company, generally considered one of the half dozen "leaders" to come out of the biotechnology startup spree, has seen its cash position weakened considerably in 1984: Current assets shrank from $30.2 million at the beginning of the year to just over $17 million at the end of September, largely a factor of unexpectedly high startup costs for its Paducah, Ky., L-phenylalanine facility.

On first glance, seven-year-old Genex appears to be coming off an exceptionally strong quarter. Third-period revenues more than quintupled to $19.3 million, including $10.7 million in product sales. But the company notes that unique circumstances make it difficult to predict future results from the data. Third-quarter sales were far higher than anticipated, Genex says, and probably will be substantially lower in the final three months of the year. Furthermore, $6.9 million of the revenue total represents a one-time gain stemming from an agreement with Allied to terminate two R&D projects with Allied subsidiary Bendix.

In a similar move to control expenses, Biogen has cut staff by 56 positions, or 13% of the total, half in the U.S. and half in its Geneva, Switzerland, headquarters. "We have taken steps to correct for overstaffing that developed during our rapid expansion over the past two years," says Walter Gilbert, chairman of the company. "This belt-tightening will ensure that the growth in expenses in the near term will be moderate. It will not affect the timing of our products coming to market."

In a different example of the financial ramifications of making a transition, Advanced Genetic Sciences is taking the risk of severely pruning its R&D contract activities—its chief sources of revenues—in order to concentrate on proprietary research. The immediate consequence of this ongoing program has been a steep reduction in revenues and an increase in losses. In the third quarter of 1984, revenues totaled just $23,204, compared to $576,766 in the same period last year. The company's net loss for the quarter nearly doubled to $1.7 million.

"This is consistent with our strategic decision made some years ago to become a fully integrated manufacturing and marketing company based on products developed in our laboratories and the related decision not to enter into additional research contracts except on a very limited basis with our shareholders," comments Daniel D. Adams, AGS's chairman and chief executive officer. "We believe such contracts interfere with our business development and in general are not profitable."

Several companies—still primarily those selling monoclonal antibody-based diagnostic products or instrumentation, reagents, and other supplies to the biotechnology market—continue to report sharp increases in product sales. For example, Hybritech, which is focused in monoclonals, recorded a 79% increase in product sales to $3.4 million in the third quarter. Over the nine-month period, the company's product sales more than doubled to over $9.5 million.

Hybritech's competitor, Monoclonal Antibodies—against which Hybritech currently is pressing a patent infringement suit—also recorded a steep rise in product sales: up 171% in the third quarter to $880,282. And Molecular Genetics, the sole product of which is a monoclonal antibody preventative for *Escherichia coli* scours in newborn calves, had a 604% gain in product sales to $936,815 for the first nine months of 1984. □

UNITED STATES

After a sharp rebound, expansion slows for the chemical industry

Business is likely to improve further, but next year's gains will be slimmer than those of the past two years

David M. Kiefer, C&EN Washington

For the U.S. chemical industry—which started 1984 with 12 months of sparkling growth in output behind it and profits rising dramatically—the past year has been something of a disappointment. It is true that for industrial chemical firms, production and sales this year will be a solid 7% higher than last year and that earnings will be up a sharp 40 to 50%.

But most of the year-to-year improvement occurred during the early part of the year. During the first six months, for example, net income was nearly 70% higher than in the year before; during the second half, on the other hand, profits are just 15 to 20% higher. Meanwhile, production of basic chemicals and synthetic materials (including plastics, fibers, and rubber), which at the start of the year was running nearly 20% above year-earlier levels, at present essentially is no higher than it was last January—or, for that matter, than at the start of 1980. And with demand still well below plant capacity, selling prices for industrial chemicals, too, have weakened slightly since mid-1984.

The recent leveling off in operations in the chemical industry reflects, to a large degree, a similar trend throughout much of the U.S. economy. Gross national product, up 10% in the first quarter and 7% in the second quarter of 1984, posted a gain of less than 2% in the third quarter. And the current quarter is expected to show no stronger increase. The Commerce Department's index of leading indicators, designed to be a harbinger of broad economic trends, was sharply lower in October. And housing starts, new orders for manfactured goods, and several other economic measures have been declining during the past few months.

As the year closes, nevertheless, executives of U.S. chemical companies remain optimistic regarding the outlook for business in the near future. A recent survey of its members by the Chemical Manufacturers Association, for instance, finds that they expect healthy increases in both sales and profits in 1985, although not up to this year's pace. Analysts outside the industry likewise expect business to be better for chemical producers next year.

But it also is clear that industry executives' optimism now is much more guarded than it was a year ago. Edwin C. Holmer, president of Exxon Chemical, noted recently, for example, that "it appears that recovery in the petrochemical sector has run out of steam," with profit margins sharply lower. No matter what happens in the rest of the industry, he thinks that earnings from petrochemicals will be down next year.

Prospects for the chemical industry in 1985 hinge, of course, on how well the overall economy fares. And on this issue, economic opinion is divided at present. The majority opinion among business analysts is that the current stint of slow growth does not indicate that the expansion of the past two years is now grinding to a halt. Rather, they see it only as a short-term pause before another round of somewhat brisker gains, at least during the first two or three quarters of 1985. With inflation seemingly in check, interest rates trending downward, and ample productive capacity available, they argue that the economy has ample resources to maintain steady growth during the immediate future.

Few expect to see a repeat during the current recovery of the hyperactive expansion that marked the latter part of 1983 and the first half of this year. But the consensus is that real gross national product will increase at an annual rate of 3 to 4% during the first two quarters of 1985, and then will continue to grow, although more moderately, at least through the end of the year. Consumers still appear to be in a confident, money-spending mood, capital spending by industry is on the upswing, credit is not tight enough yet to choke off expansion, and inventories do not seem excessive.

But by no means are all economists so confident. The huge federal budget deficit worries many, as does the U.S.'s large and growing trade deficit. Money flowing abroad to pay for imports is money lost to domestic producers. Some argue, in fact, that the recovery already is dragging to an end and that the economy will be in recession before the winter is through. According to Roger Williams, an economic consultant in Orangeburg, N.Y., for one, "We must recognize that somewhere in the current quarter the downturn in the economy began." Williams expects recession to last at least through the third quarter of 1985.

Whatever prognostication proves correct, it is clear now that demand is easing in the chemical-consuming segments of the economy that fueled the chemical industry's growth in 1983 and 1984. Nearly all major chemical markets have been surprisingly healthy during the past year or two. But it is increasingly difficult to find areas with potential further growth in demand.

The automobile industry is one example. For much of this year, the industry's biggest problem has been to turn out enough cars to satisfy customers. During the 1984 model year, sales were up 18% (to 10.4 million cars) and, with imports' share of the market declining slightly, sales of U.S.-produced autos increased 22% to 7.9 million. Demand, moreover, still is strong and supplies are low, even tight for some popular models.

As a result, U.S. assembly lines are producing at a near-capacity clip; output during the current quarter is scheduled at close to 2 million cars, the highest for any fourth quarter since 1978. And for the year as a whole, output of U.S. cars probably will total 7.8 million, 15% more than in 1983 and at the highest level since 8.4 million units were completed five years ago.

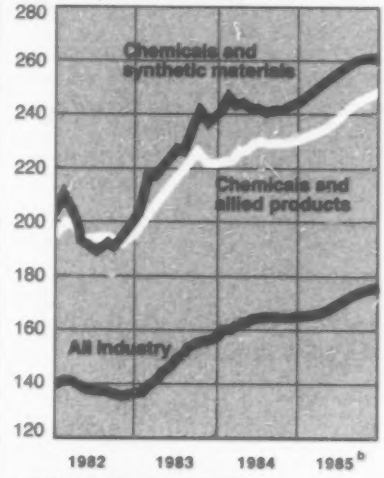
The auto industry is looking for continued strong sales again next year, perhaps running as high as 10.7 million cars. But that would translate into a growth in output of only about 2 to 5%. Consequently, automobiles are likely to provide a good market for chemical products during the next 12 months, but not really a growth market.

Housing is another outlet for chemicals where prospects for further growth seem limited. After a sharp increase in new housing starts last winter, activity gradually has dwindled, stifled in part by rising mortgage interest rates during the spring and summer. Housing starts this year probably will total between 1.7 million and 1.8 million, only slightly higher than in 1983. Mortgage credit has become less costly in the past few months. But unless it continues to ease considerably, which few analysts expect, new home building is unlikely to grow further again in 1985.

Demand for agricultural chemicals is one area that has made a strong comeback this year, after being crimped in 1983 by the government's payment-in-kind program to reduce surpluses, which took a lot of land out of cultivation, and poor weather. According to estimates by Continental Illinois National Bank, as farmers boosted their acreage this year they also increased their spending on fertilizers more than 20%. And favorable weather also has brought higher demand for pesticides and other farm chemicals. Total production of agricultural chemicals this year probably will top last year's output 12 to 13%, and demand continues strong for fertilizer materials, both in domestic and export markets, during the latter part of the year.

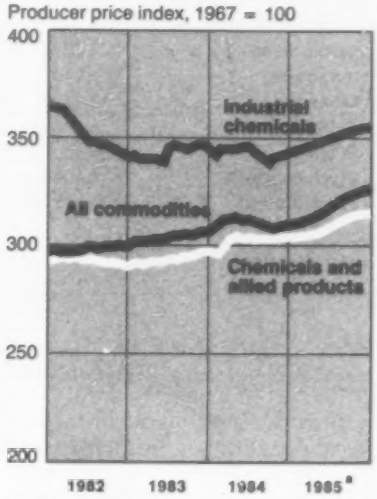
This growth is likely to slacken next year, however. A sharp increase in crop production this year has depressed prices and undercut farmers' income, for one thing, with little or no improvement expected next year. And the Department of Agriculture predicts that acreage planted in major

Output of chemicals will be up moderately next year . . .



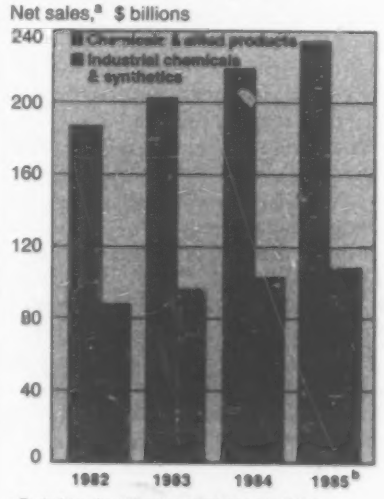
a Seasonally adjusted. b C&EN estimates.
Source: Federal Reserve Board

. . . and selling prices will be a bit higher . . .



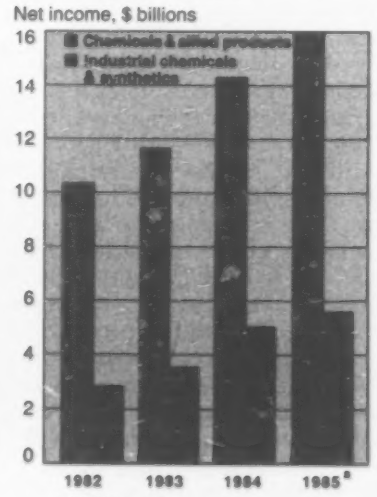
a C&EN estimates.
Source: Bureau of Labor Statistics

. . . so industry's sales will rise for third year . . .



a Excludes sales of foreign subsidiaries. b C&EN estimates. Source: Bureau of the Census

. . . and its earnings will continue to recover



a C&EN estimates.
Source: Bureau of the Census

Production of chemicals will rise in 1985, but the gains will be smaller than this year's

	1982	1983	1984	1985
INORGANIC CHEMICALS				
Thousands of tons unless otherwise indicated				
Ammonia	15,776	13,683	16,000	16,600
Chlorine gas	9,176	9,960	10,800	11,300
Hydrochloric acid	2,460	2,608	2,850	3,000
Nitric acid	7,390	7,373	8,000	8,350
Oxygen, billions of cu ft	349	347	385	410
Phosphoric acid	8,262	9,950	11,000	11,500
Sodium hydroxide	9,385	10,230	11,100	11,600
Sulfuric acid	32,680	34,725	38,900	40,400
ORGANIC CHEMICALS				
Millions of lb unless otherwise indicated				
Acetic acid	2,748	2,807	2,800	3,000
Acetone	1,694	1,859	1,860	2,000
Acrylonitrile	2,035	2,146	2,250	2,400
Benzene, millions of gal	1,052	1,233	1,400	1,500
Butadiene	1,915	2,353	2,600	2,700
Cumene	2,743	3,345	3,350	3,500
Cyclohexane	1,275	1,656	2,100	2,200
Ethylene	24,501	28,680	32,200	34,800
Ethylene glycol	4,309	4,425	4,900	5,150
Formaldehyde	4,817	5,465	5,800	6,000
Methanol	7,555	7,982	9,500	9,000
Phenol	2,023	2,638	2,750	2,900
Phthalic anhydride	684	838	925	975
Propylene	12,535	13,959	15,700	17,000
Styrene	5,942	6,602	7,700	8,100
***o*-Xylene**	802	781	770	820
***p*-Xylene**	3,391	4,114	4,250	4,500
PLASTICS				
Millions of lb				
Polyethylene, high density	4,928	5,707	6,100	6,500
Polyethylene, low density	7,503	8,045	8,350	8,700
Polypropylene	3,477	4,464	5,000	5,300
Polystyrene	3,191	3,606	3,900	4,050
Polyvinyl chloride	5,326	6,152	6,600	6,750
SYNTHETIC FIBERS				
Millions of lb				
Acrylic and modacrylic	624	670	680	650
Nylon	1,927	2,419	2,400	2,300
Olefin and vinyon	723	906	970	1,000
Polyester	3,169	3,544	3,350	3,250

Sources: Bureau of the Census, International Trade Commission, Society of the Plastics Industry's Committee on Resins Statistics, Textile Economics Bureau, C&EN estimates (for 1984 and 1985)

crops in 1985 will increase little, if at all. It estimates, therefore, that use of fertilizer will be up only about 2% in the farm year ending next June and that application of pesticides will show little or no gain.

One major market for chemical products that clearly is being crimped during the closing months of 1984 is textiles. Shipments of noncellulosic fibers during the third quarter were 5% lower than in the previous quarter or in the corresponding quarter of 1984, according to data from the Textile Economics Bureau. Much of the blame falls on rising imports of both fibers and textiles. At the same time, abundant cotton supplies and fashion trends that favor natural fibers over synthetics, especially polyesters, have sapped U.S. consumption. And the strength of the U.S. dollar relative to foreign currencies has cut severely into demand from overseas.

Although the impact of rising imports probably is most apparent with man-made fibers, competition in U.S. markets from abroad also is a factor increasingly cutting into demand and depressing prices for a broad range of U.S.-made chemicals. Imports of chemicals of all types will increase close to $3 billion (about 25%) this year. In addition, the rapidly widening U.S. trade deficit in other manufactured products—whether they be textiles, motor vehicles, electronic products, or appliances—indirectly but markedly diminishes U.S. chemical sales.

At the same time, the strength of the dollar has been a persistent problem in another way. Foreign subsidiaries are significant contributors to the earnings of most U.S. chemical producers, but recent gains in overseas operations have been offset, financially, when local results are translated into dollars. This problem is especially acute for U.S. drug companies, which typically get 30 to 40% of their sales and income abroad.

The pharmaceutical business also has been adversely affected by a more competitive marketplace, caused in part by efforts of the federal government to contain medicare-related hospital expenses and by the expiration of patent protection on some major drugs. As a result, the industry is likely to chalk up relatively modest (for it) increases of about 7% in sales and 10% in profits this year. Next year, especially if the dollar weakens (as many observers predict) and overseas results correspondingly improve, drug makers probably will do a bit better.

For producers of industrial chemicals, too, 1985 looks reasonably good. Production, C&EN estimates, will be 4 to 5% higher than this year, although most of the increase will take place during the first half. Competition will keep selling prices under pressure, so on average they probably will be only 1 to 2% higher than this year. That means that sales will rise about 5 to 8%, approximately the same as this year. But as also has been the case this year, manufacturing costs are likely to be under control. Reflecting stable to lower world energy prices, raw material costs, especially for petrochemicals, will be little changed. And labor costs probably will rise only modestly.

All of which adds up to an increase in profits that, although not nearly so great as this year, may well be in the range of 10 to 15%. Putting that gain into perspective, profits next year from industrial chemicals will be just about what they were in 1981. □

FOREIGN TRADE

Strong dollar crimps surplus in U.S. trade in chemicals

Chemical exports are up nicely, but growth in the U.S. economy leads to an even bigger surge in imports

Earl V. Anderson, C&EN New York

World trade has always been important to the U.S. chemical industry. Now, it figures to become even more important—for all the wrong reasons.

However, until recently, world trade has never meant much in the life of the average American. Now, it is becoming much more important—again, for all the wrong reasons.

The burgeoning U.S. trade deficit has become a widespread concern. After hitting $69.4 billion last year, the trade deficit will climb to a staggering $130 billion or more this year.

These figures are based on U.S. imports calculated by the cif method, which includes the cost of freight and insurance. Their impact is undeniably dramatic. On the more conventional "customs" basis for tallying U.S. imports, the trade deficit this year will be "only" $113 billion, compared to $57.5 billion last year.

These lower numbers are little consolation. The direction in which world trade has been, and is, headed holds some serious consequences for the U.S. chemical industry, and for the entire U.S. and world as well.

For the U.S., international trade and the domestic economy are becoming ever more closely interrelated. The U.S. economy has been on a roll this year. Economic recovery has been faster and stronger in the U.S. than anywhere else in the world.

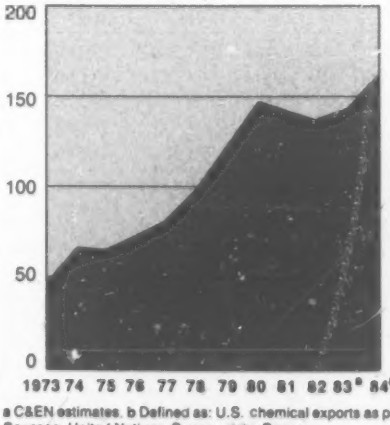
That fact alone would be reason enough to expect a boost in imports. But, because the dollar has remained surprisingly strong relative to major foreign currencies, U.S. imports have soared. They probably will end the year at a record $330 billion, 28% higher than last year.

You have to go back to 1974 to find an annual advance higher than that. Then, the sudden jolt to the cost of importing oil accounted for the big jump in imports. This year, the increase in the oil-import bill accounts for less than 10% of import growth. Now, manufactured products are swelling the import total.

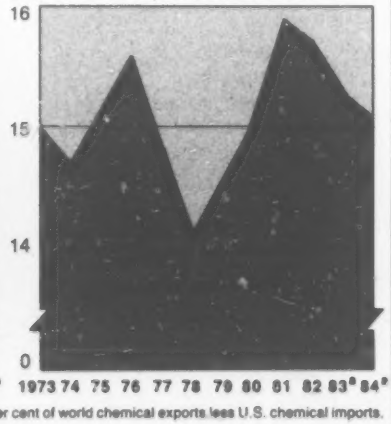
The strong dollar has had an undeniably adverse impact on the U.S. trade balance. It also is a key link between international and domestic economics. The stronger the dollar, the less expensive imports become for the American consumer. Thus, the strong dollar, along with a growing U.S. economy, explains the import surge.

Conversely, the stronger the dollar, the more expensive U.S. exports become on world markets. That makes it difficult for U.S. manufacturers to compete in international trade. It is no surprise, there-

World trade rebounds smartly this year . . .

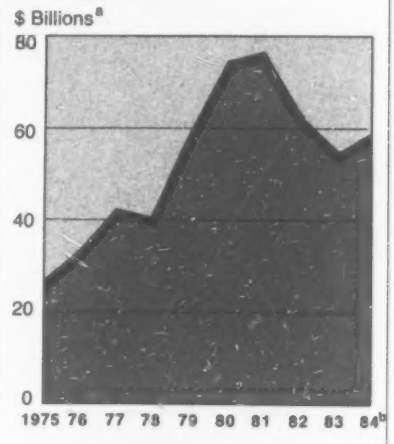


. . . but share held by U.S. continues to decline

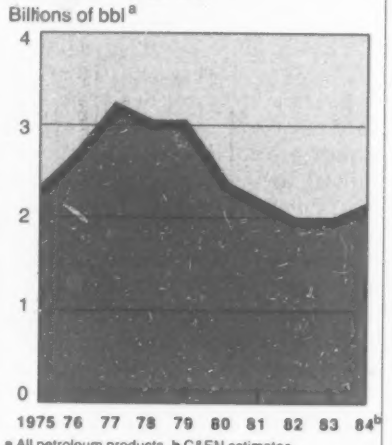


a C&EN estimates. b Defined as: U.S. chemical exports as per cent of world chemical exports less U.S. chemical imports.
Sources: United Nations, Bureau of the Census

U.S. spends a bit more to import oil . . .

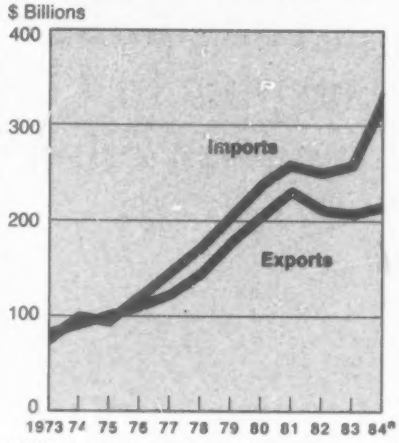


. . . as volume of imported oil rises slightly

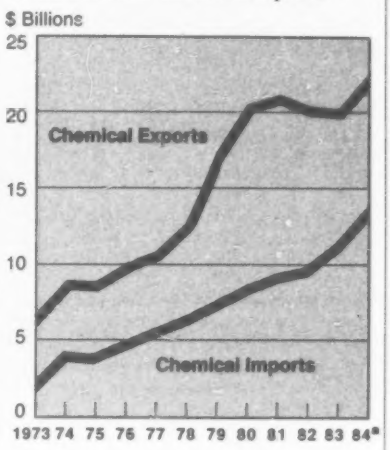


a All petroleum products. b C&EN estimates.
Source: Bureau of the Census

Import surge lifts total U.S. trade deficit sharply . . .



. . . and brings small decline in chemical trade surplus



a C&EN estimates. Source: Bureau of the Census

fore, that U.S. exports this year will increase only about 8% to $217 billion.

According to most economists, the dollar is more than strong—it is overvalued. In the past four years, the dollar has risen more than 60% against a basket of major foreign curencies. These include such traditionally strong currencies as the West German mark and the Japanese yen.

If the dollar is, in fact, the link between the international and domestic economic scenes, the linchpin on the domestic end is the huge deficit in the federal budget. Most economists agree that the deficit is a major reason that the U.S. dollar now is so strong relative to major foreign currencies.

The federal deficit, when added to normal personal and business borrowing requirements, keeps interest rates higher than they otherwise would be. High interest rates, in turn, attract large amounts of foreign money into dollar assets. The result: an overvalued dollar.

That dollar's impact on the U.S. job market is substantial. C. Fred Bergsten, a former Treasury Department official and now director of the Institute for International Economics, estimates that more than 2 million jobs have been lost in industries that either export or compete with imports. U.S. multinational

Chemical exports rise modestly, but imports make dramatic gains

$ Millions	U.S. chemical exports				U.S. chemical imports			
	1984[a]	1983	1982	1981	1984[a]	1983	1982	1981
Organic chemicals	$ 6,311	$ 5,326	$ 5,440	$ 5,929	$ 4,352	$ 3,477	$2960	$2974
Plastics and resins	4,014	3,732	3,650	3,809	1,523	1,098	766	780
Medicinals and pharmaceuticals	2,632	2,494	2,275	2,165	911	703	563	583
Inorganic chemicals	2,163	1,838	1,969	2,286	2,108	1,615	1502	1573
Fertilizers, manufactured	1,806	1,267	1,386	1,735	1,183	997	963	1181
Radioactive materials	1,137	1,213	1,132	988	1,142	952	1143	786
Pesticides and disinfectants	736	630	607	544	354	251	265	283
Flavors, perfumes, cosmetics, and toiletries	513	493	514	535	517	370	295	289
Pigments, paints, and varnishes	335	320	332	349	218	145	103	102
Cleaning and polishing materials	312	295	324	396	109	90	76	74
Explosives and pyrotechnics	178	87	90	90	95	64	67	61
Dyeing, coloring, and tanning materials	156	163	162	175	367	300	213	226
Miscellaneous	2,007	1,885	2,010	2,187	721	717	579	534
TOTAL	$22,300	$19,751	$19,891	$21,187	$13,600	$10,779	$9494	$9446

a C&EN estimates. Source: Bureau of the Census

companies, he says, are shifting some of their production to foreign subsidiaries.

The obvious starting point for solving the growing U.S. dilemma in international trade is to reduce the federal deficit. Both the Administration and Congress will be spending a lot of time trying to do just that.

Cutting the federal deficit would force interest rates lower. Dollar assets would become less attractive to foreigners. The value of the dollar would decline.

Bergsten suggests that the value of the dollar should be corrected 30 to 35% from current levels. But how the U.S. handles the problem can have a huge impact, not only on the U.S. economy, but on the world economy and international trade as well.

Most economists agree that the dollar should not—indeed, cannot—stay at its present level. But if its value drops too far too fast, the economic consequences could be devastating. Interest rates would take off again. Double-digit inflation would return. And most of the world would find itself in another recession.

The consensus seems to be that the only workable solution is to reduce the budget deficit gradually. This, in turn, will lower interest rates and dollar-exchange rates gradually, and steer the U.S. economy to a "soft landing."

How these problems are resolved will have a tremendous impact on U.S. chemical trade. Chemical exports and imports are no less susceptible to the influences of a strong dollar, a strong domestic economy, and weaker economies overseas than any other exports or imports.

The U.S. chemical industry has prided itself on its long string of chemical trade surpluses. In the early 1970s, the surplus alone was greater than the value of chemical imports.

Now, that chemical trade surplus is dwindling, and it has long since dipped below the value of chemical imports. This year, U.S. chemical companies will export $22.3 billion worth of chemicals, up a respectable 13% over 1983. Chemical imports, however, have flooded the country to the tune of $13.6 billion, a disconcerting 26% increase over last year.

As a result, the vaunted chemical trade surplus will shrink to $8.7 billion, the fourth consecutive year in which it has declined. In 1980, it stood at a lofty $12.1 billion. And where once the U.S. imported less than 40% as much chemicals as it exported, it now imports more than 60%.

Myron T. Foveaux, assistant director of government relations for the Manufacturing Chemists Association, estimates that chemical exports will increase only 3% next year. The Commerce Department, meanwhile, says that 1985's chemical imports will be only 4% higher.

If both these estimates are correct, the chemical trade surplus will improve slightly. But a lot depends on how much the U.S. economy slows. A slower economic pace would curb chemical imports.

But, if the U.S. economy is the locomotive that pulls the world economy, a slowdown in the U.S. could nip recovery elsewhere. This would hurt U.S. chemical export prospects.

Next year, too, the impact of Saudi Arabia's petrochemical exports will begin to be felt. All of these factors will influence the trade fortunes of U.S. chemical companies.

And overshadowing all of them will be the value of the U.S. dollar. □

Chemical trade with West Europe shows an unusual deficit

$ Millions	1984[a]	1983
U.S. CHEMICAL EXPORTS		
Canada	$ 2,810	$ 2,546
Latin America	3,746	3,273
Western Europe	6,422	5,892
Eastern Europe	268	306
Japan	2,921	2,607
Communist Asia	602	353
Middle East	424	423
Rest of Asia	3,278	2,859
Australasia	937	696
Africa	535	492
Other	357	304
TOTAL	$22,300	$19,751
U.S. CHEMICAL IMPORTS		
Canada	$ 2,897	$ 2,390
Latin America	1,210	924
Western Europe	6,460	5,020
Eastern Europe	313	197
Japan	1,319	1,099
Communist Asia	163	131
Middle East	123	113
Rest of Asia	381	283
Australasia	258	234
Africa	204	227
Other	272	161
TOTAL	$13,600	$10,779

a C&EN estimates. Source: Bureau of the Census

Lackluster agricultural exports and soaring imports lead to record U.S. trade deficit

$ Billions	U.S. exports				U.S. imports			
	1984[a]	1983	1982	1981	1984[a]	1983	1982	1981
Chemicals	$ 22.3	$ 19.8	$ 19.9	$ 21.2	$ 13.6	$ 10.8	$ 9.5	$ 9.4
Machinery and transportation equipment	89.3	82.6	87.1	95.7	120.0	86.1	73.3	69.7
Other manufactured goods	30.8	30.0	33.0	37.3	89.8	66.5	61.1	63.4
Food and live animals	24.0	24.2	24.0	30.3	18.5	15.4	14.5	15.2
Beverages and tobacco	2.4	2.8	3.0	2.9	3.6	3.4	3.4	3.1
Minerals fuels, lubricants, and related materials	9.1	9.5	12.7	10.3	62.7	58.0	65.4	81.4
Crude materials (inedible) other than fuels	21.1	18.6	19.2	21.0	11.2	9.6	8.6	11.0
Animal and vegetable oils and fats	2.0	1.4	1.5	1.7	0.7	0.5	0.4	0.5
All other products	10.4	7.0	6.9	8.4	9.9	7.7	7.7	7.3
TOTAL	$217.0[b]	$200.5[b]	$212.2[b]	$233.7[b]	$330.0	$258.0	$244.0	$281.0

a C&EN estimates. b Includes re-exported imports (not included in individual product categories). Source: Bureau of the Census

WESTERN EUROPE

Chemical makers are experiencing a year of sharply improved profits

Slow future growth and more competitive markets for many bulk chemicals remain a severe threat

Dermot A. O'Sullivan, C&EN London

West European chemical companies are coming through this year with flying colors. Most executives are in accord with BASF chairman Hans Albers, who says, "Both in respect to quantity and quality, 1984 will be remembered in our annals as a good year."

The extent of the improvement in the first nine months this year, compared to last year's similar period, shows in the financial statements of those companies that issue quarterly results. Akzo, headquartered in Arnhem, the Netherlands, which for some time has been bogged down by the general weakness in man-made fibers, doubled its net profit in the January-to-September period from the year-earlier level.

Akzo's operating income from fibers gained 147% to $65.1 million (22% of total operating income), followed closely by chemicals, up 141% to $87.1 million (29% of the total). Coatings turned in the poorest operating income gain, 3% to $33.1 million (11% of the total)—largely because of the adverse influence of strikes in the metalworking and automotive industries and poor results of operations in France.

Gains in the nine-month earnings of BASF, Bayer, Hoechst, Imperial Chemical Industries (ICI), and Norsk Hydro over 1983 were 60% or better. All the companies' results were more encouraging considering the comparatively moderate improvement in their sales.

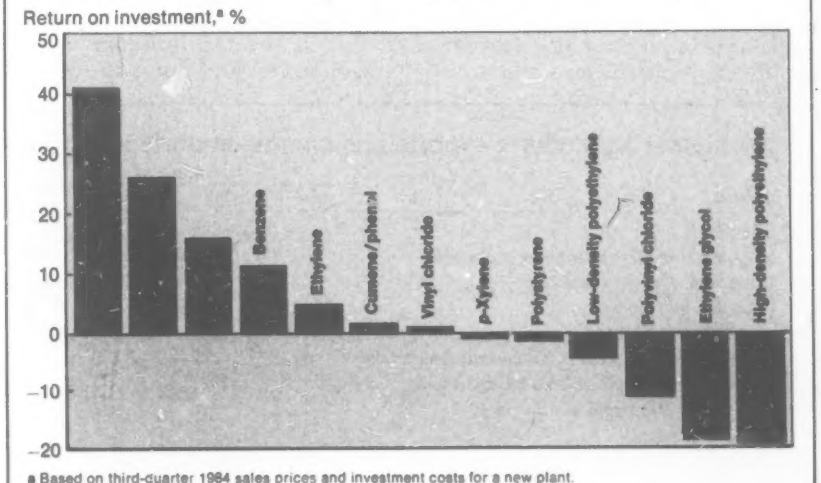
For companies active in agrichemicals and pharmaceuticals, the profit surge, ironically, is a cause for some embarrassment. There is an upturn of criticism on the part of environmental activists over growing use of pesticides. And the public's increased awareness of profits generated by pharmaceutical sales has sparked a debate on the issue of prescribing generic drugs.

The chemical earnings of European-based oil companies, too, have rebounded. London-based BP Chemicals International, for instance, achieved an operating profit of $74.2 million in sharp contrast to the $81.6 million loss experienced between January and September last year (calculated on a comparable currency exchange basis). Sales were up more than 15% to almost $1.8 billion. Net income from the global chemical activities of Royal Dutch/Shell (including those in Canada and the U.S.) surged a remarkable 329% to nearly $313 million on sales that advanced 17% to $5.4 billion.

A number of factors have helped bolster the fortunes of European chemical companies this year. Predominant among them are the U.S. economic recovery and the continued strengthening of the U.S. dollar against European currencies.

The boom in U.S. demand has led

Some petrochemicals are still unprofitable in Europe



a Based on third-quarter 1984 sales prices and investment costs for a new plant.
Source: Chem Systems International

to an increase in sales opportunities for Europeans, both as exporters and as operators themselves of U.S.-based production units. Bayer chairman Hermann-Josef Strenger, for example, notes that his company's U.S. sales during the first nine months of this year advanced 29% to $2.6 billion, almost a quarter of the company's total worldwide sales. Coincidentally, U.S. chemical producers largely have focused their attention on meeting their own domestic demand. Their competitive threat in Europe and elsewhere has receded because there has been less incentive to export.

The seemingly inexorable hardening of the dollar against European currencies continued this year. In September, the value of the French franc, the Italian lira, and the U.K. pound, in dollar terms, was about 50% what it had been in January 1981. The West German mark's value has stood up somewhat better, declining about 33% against the dollar over the same period. In the shorter time span between September 1983 and September this year, the franc moved down 13%, the lira 14%, the pound 16%, and the mark 12%.

Although the relative weakness of European currencies has ruffled some political feathers out of a sense of national pride, it has done much to boost the price competitiveness of European chemicals in dollar trading areas. Moreover, dollar revenues are showing up as higher figures when translated into European currencies, thereby adding to the fiscal gains of companies headquartered in Frankfurt, London, Paris, and elsewhere in Europe.

Of course, the converse also holds for managers of U.S. companies operating throughout Europe. Even though their business may be attaining satisfactory sales and earnings gains at local currency levels, results in dollars don't look nearly so well when reviewed in the boardrooms of their U.S. corporate parents.

Hardening of the dollar doesn't always work to the Europeans' benefit, however. Oil and naphtha, for instance, priced in dollars, cost more to purchase in local currencies when the dollar is strong. However, prices of oil and gas have held fairly steady this year because the general weakening of oil prices has tended to compensate for the parity shifts.

Also, adds David R. Clair, president of Essochem Europe, "higher West European utilization of plant capacity seems to have more than offset the negative impact of exchange rates on European feedstock and energy costs."

One area where U.S. companies in Europe have gained from the dollar's strength is in labor costs. The experience at Du Pont, for example, is that "the 1984 European payroll, although it has increased in terms of local currency, when expressed in dollars will amount to no more than 85 to 90% of the corresponding 1983 figure because of the continuing strengthening of the U.S. currency."

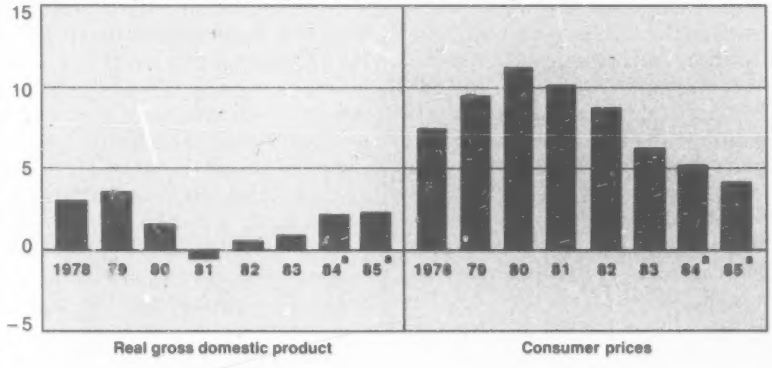
Overall, wages in the European chemical industry this year moved up 3 to 7%, generally at or slightly below inflation. There are some exceptions, however. For Akzo and DSM in the Netherlands, the level was unchanged from 1983. Because of the high rate of Dutch unemployment, about 15% of the labor force, "the unions were very cautious in their demands," one Akzo executive notes. On the other end of the spectrum, there was a 14% increase in salaries in Italy, well ahead of the 10% rate of inflation there.

The surge in profits notwithstanding, chemical company managers admit to some apprehension about the near-term outlook. The consensus is that business expansion will continue next year, but at a slower rate. It also appears likely, moreover, that the U.S. economy will not grow at a rate comparable to the rate in 1984, with the result that U.S. producers once again may sharpen their export drive. A weakening of the dollar, should it occur, would exacerbate the situation.

Anil C. Parikh, director of plan-

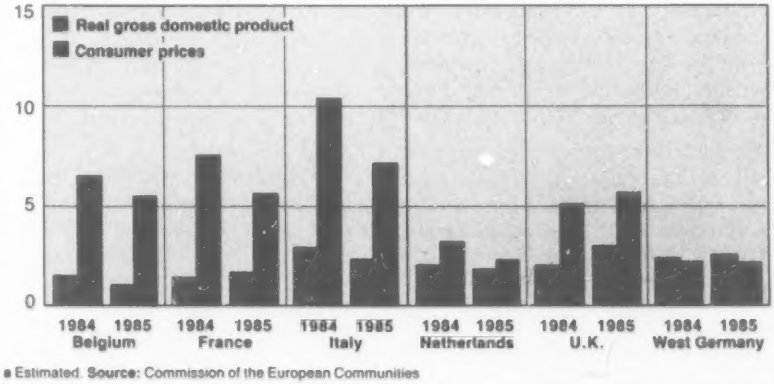
Economies grow moderately but inflation slows sharply . . .

% annual change for overall European Economic Community



. . . in the major nations of Western Europe

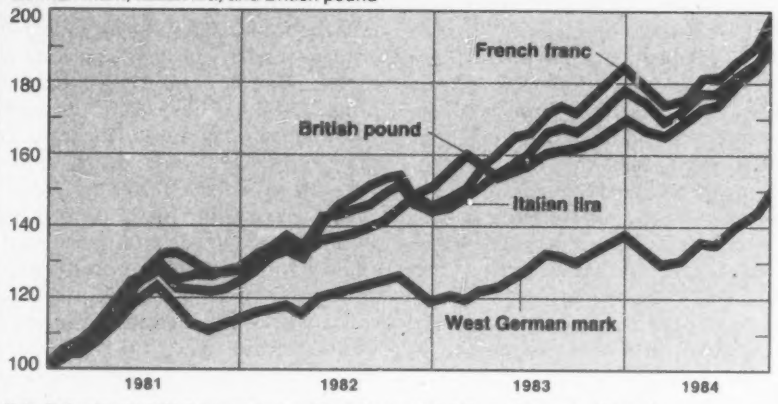
Estimated % annual change



* Estimated. Source: Commission of the European Communities

Dollar is stronger than ever in Europe this year

Relative value of U.S. dollar vs. French franc, West German mark, Italian lira, and British pound[a]



Note: During January 1981, the average value of the dollar stood at 4.64 francs, 2.01 marks, 953 lira, 0.4 pound. [a] January 1982 = 100. **Source:** International Monetary Fund

ning and business development at Monsanto Europe's Brussels headquarters, takes a somewhat more sanguine view. "There already are signs that Western Europe is not as dependent on the U.S. economy as it was in the past," he maintains.

Citing prognostications that the rate of gross domestic product (GDP) growth in the U.S. next year might be only about half this year's level and that it might retreat further in 1986, he doesn't foresee any such drop in the European economies. Indeed, he expects Europe's GDP growth in 1986 to just about match that of the U.S. "This should result in a more stable situation as far as the European chemical industry is concerned," he remarks.

A link always has existed between growth in GDP and that of the chemical industry. In the heady expansionist times of the 1960s and early 1970s, it was almost an immutable fact that a GDP multiplier of 2 or 2.5 could be used to gauge growth of commodity chemicals. In other words, if GDP grew 4%, demand for chemicals could be relied on to expand 8 or 10%. Currently, however, this multiplier has moved down to close to 1.

Gaston Beauregard, head of planning at Shell International Chemical's petrochemicals division in London, believes there is "need to look at our industry in relation to the index of industrial production rather than the more conventional GDP." He argues that this would provide a more accurate picture of the link between chemicals and the overall level of industrial activity "because a greater proportion of GDP now is generated by service industries."

Monsanto's Parikh agrees. "The index of industrial production undergoes bigger swings than GDP does. The peaks are higher, the troughs are lower. But either way, the relationship between industrial production and chemical production is valid."

Ray R. Knowland, BP Chemicals' managing director, admits to concern that 1986 will see a downturn in business generally. But some worry that this view could become a self-fulfilling prophecy if expressed often enough.

Although acknowledging that the situation is serious, Hugo Lever, director general of the European Council of Chemical Manufacturers' Federations (CEFIC), contends that economic cycles are to some extent "a psychological thing, a state of mind. We can talk ourselves into trouble," he remarks, although he admits that the "current deficits that are preventing many governments from taking appropriate corrective actions can be a real problem."

It is true, nonetheless, that global business does move in cycles, and a decline may be on the way. Indeed, there are indications that a downturn already has set in for European man-made fibers. Although output of acrylics, polyamides, and polyesters has risen slightly from 1983 levels, deliveries to customers have retreated. The drop is greatest for acrylics, off almost 3% to about 1.66 billion lb. Deliveries of the polyesters are off 1.5% to 1.57 billion lb and deliveries of polyamides are down 1.1% to about 1.16 billion lb.

Experts at the International Rayon & Synthetic Fibers Committee (CIRFS) in Paris, who monitor the industry, foresee the pattern continuing next year. They also are concerned about the arrival in Western Europe of acrylic fibers from large plants that have come on stream recently in Turkey. Turkish acrylics entering Europe this year amounted to about 26 million lb, up from none previously.

Although the man-made fibers operations of European chemical companies hardly can be considered robust, business has been creeping slowly into the black in the past year or so. Some measure of help has come from the multifiber arrangement (MFA) drawn up by the General Agreement on Tariffs & Trade (GATT) to ensure orderly expansion in world trade in textiles. MFA imposes a ceiling on textile imports from developing countries.

The current MFA, which regulates 80% of world trade in textiles, expires July 31, 1986. Presumably, moves will get under way next year toward its renewal. But already the European Bureau of Consumers' Unions in Brussels is scoring MFA as having "failed in all its objectives except that of operating as a highly protectionist device for European industry," claiming that it has resulted in price increases of up to 30% on textiles and clothing imported into Europe.

In the petrochemicals arena, the imminent arrival of products from Saudi Arabia is the main topic of discussion. Two large methanol units now are on stream there. Soon, units

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making ethylene glycol, linear low-density polyethylene, and other petrochemicals will start up.

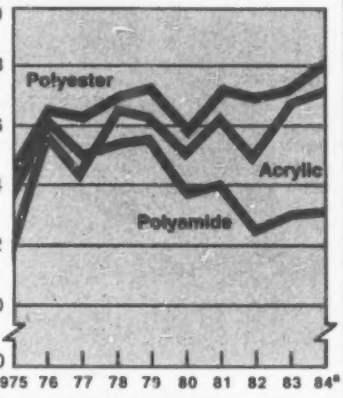
Reactions of Europeans to what undoubtedly will be a new competitive dimension in the marketplace are varied. John N. Turnbull, business general manager for polyolefins at BP Chemicals, makes the point that "the issue of Saudi petrochemicals is not news any more. We have been aware of their coming and have been making the necessary adjustments." Adds CEFIC's Lever, "A lot of the emotion has been taken out of the Middle East chemicals threat. The fact that people there can make petrochemicals from gas that's now flared is reasonable."

Nonetheless, there have been understandable noises of concern, particularly by those whose market shares will come under threat from Saudi products. Some have suggested invoking import protective measures under European Economic Community or GATT rules. Others have talked about cutting prices to maintain market share.

At the Society of Chemical Industry meeting in Cannes, France, in October, Günter Metz, a board member of Hoechst, made the point that "protectionist measures lead to a decline in international trade, which is harmful to all concerned. Restraints are regarded by the German chemical industry, and hopefully by the West European chemical industry as a whole, as unsuited for solving the problem of future petrochemical imports from the Middle East."

Metz expresses the hope that "the partners of the Saudis in chemical joint ventures will exercise responsibility when introducing onto individual markets the quantities which they want to sell in Europe." But he admits that "a more difficult problem will be the quantities entering the European markets through dealers or direct from the oil-producing countries."

Fiber output makes modest recovery



a Estimates. Source: CIRFS (International Rayon & Synthetic Fibers Committee)

Acknowledging that import controls would achieve nothing, Martin Trowbridge, director general of the U.K.'s Chemical Industries Association, concedes that "Middle East countries will represent very tough competition for us. We reckon that by 1990, they will have taken something like a million tons a year of business from the West European chemical industry."

Trowbridge points out that this volume about matches the expected growth in the market by 1990. "This means that we shall all continue to fight for a no-growth market. There will be very difficult trading conditions, and prices will come under severe attack." As the year progressed, European producers have been able to push through price increases on most of their bulk products as customers replenished stocks. This, coupled with better plant capacity utilization, contributed to their higher profits. In recent weeks, however, prices have been drifting down again, particularly for commodity plastics. The weakness, according to Shell's Beauregard, reflects some inventory reduction. But he thinks that part of the downturn might be in anticipation of the impact of supplies from the Middle East, which actually won't materialize until well into next year.

When it comes to competing against the Saudi Arabians on prices, "There is no way the European producers can win," Mike Hyde, publisher of *Chemical Insight* and a respected observer of the international petrochemicals scene, told a recent meeting of the European Petrochemical Association. "Saudi Basic Industries Corp. and its joint venture partners will match any price cuts. They will do so in order to load their new plants. They are in a much better position to ride out any price storms."

The overhanging Middle East competition comes at a time when European petrochemicals already are encountering troubles. According to David S. Glass at Chem Systems' London office, who compiles a quarterly review of the field, profit margins over operating and selling costs for a number of key chemicals are narrowing close to the break-even line. For several chemicals, return on new capital investment already is negative.

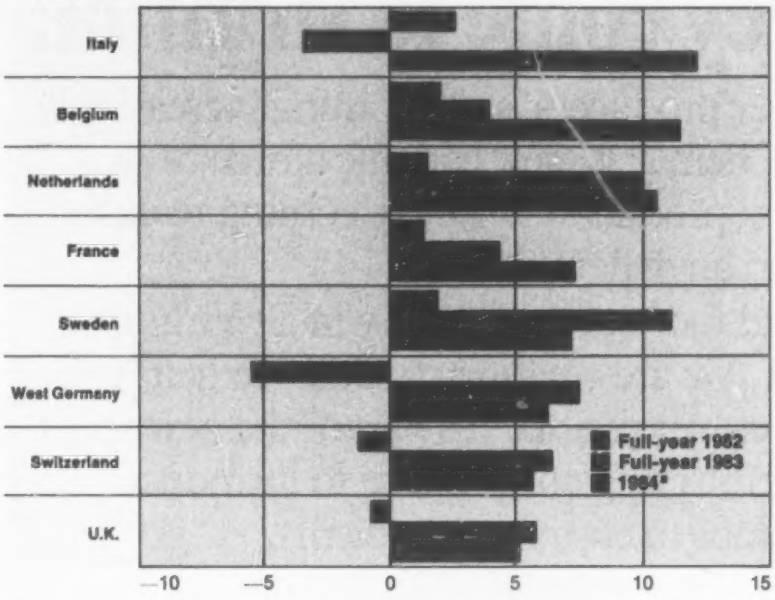
Polypropylene, with good growth

Slow growth seen for thermoplastics in West Europe during 1980s

Consumption, millions of lb	1980	1981	1982	1983	1984[a]	1985[a]	1990[a]	Estimated annual change 1980–90
Linear low-density polyethylene	132	198	297	484	770	1,100	2,200	32%
Polypropylene	2,805	3,036	3,124	3,608	3,960	4,180	4,840	6
Acrylonitrile-butadiene-styrene	684	669	715	803	858	902	990	4
High-density polyethylene	3,133	3,047	3,076	3,476	3,520	3,564	3,960	2
Polystyrene	3,615	3,410	3,403	3,740	3,850	3,850	4,103	1
Polyvinyl chloride	8,195	7,568	7,700	8,426	8,492	8,580	9,020	1
Low-density polyethylene	8,323	7,623	7,832	8,316	8,360	7,546	7,040	−2
TOTAL	26,887	25,551	26,147	28,853	29,810	29,722	32,153	2%

a Estimates. Source: Chem Systems International

Chemical production rises for second year



a 1984 data are for first nine months for Sweden, Switzerland, U.K., and West Germany, first eight months for France and Italy, first seven months for the Netherlands, and first six months for Belgium.
Sources: National chemical federations for each country

prospects still ahead, continues sound. So does acrylonitrile, largely because of strong demand for acrylonitrile-butadiene-styrene polymer. But low-density polyethylene and polyvinyl chloride, which were performing handsomely early this year, are doing much more poorly now. And returns on high-density polyethylene have been poor all along.

Ethylene glycol is in equally bad shape. Western Europe has switched from being a net exporter to becoming a net importer. According to George Ewart, ICI's chemical products general manager, some 1.28 billion lb a year of existing European glycol capacity, 45% of the total, will need to be phased out by 1990 in face of anticipated annual imports of 660 million lb, the bulk of that originating in the Middle East. For this reason, ICI and others are scaling down their involvement in unprofitable glycol, concentrating instead on higher-valued specialty derivatives of ethylene oxide.

Ray Knowland of BP Chemicals, referring to the strong profit surge for European chemical companies this year, comments that "profits are an excellent anesthetic to dull our senses to inherent problems." Probably foremost among the inherent problems, as far as the European chemical industry is concerned, is the multiplicity of producers.

In this connection, Knowland cites the fact that 19 makers of low-density polyethylene in Western Europe share a total annual capacity of 11.9 billion lb. This means that, on average, each producer has a capacity of only about 625 million lb. In contrast, the 11 producers in the U.S., where total capacity is 9.7 billion lb, each has an average yearly output capability of 880 million lb, Knowland notes.

In fairness, there have been moves to restructure the chemical industry throughout Europe. Most dramatic were measures taken in France and Italy over the past few years, where large segments of production and sales were divided among fewer companies.

This year West Germany's Hoechst decided to bow out of LDPE and ethylene-vinyl acetate copolymer. Hoechst's Ruhrchemie subsidiary is leasing its production units on a long-term basis to Italy's EniChem, which also takes over Hoechst's marketing network for the products.

Spain also has restructured its LDPE business. Recently, Dow and the state-owned Empresa Nacional del Petróleo (Enpetrol) jointly took over a unit in Tarragona from Union Explosivos Rio Tinto. Dow and Enpetrol have their own LDPE plants in Spain and will continue to compete in the marketplace. But the move reduces the number of Spanish producers from three to two. Observers believe it could signal a step toward eventual reduction in overall annual capacity from the present 1 billion lb or so, which is much more than Spain's domestic demand.

Atochem of France and ICI have opened discussions centering on ethylene oxide derivatives, ethylene-vinyl acetate copolymer, and LDPE. The goal is for ICI to phase out production of the copolymer and LDPE at Rozenburg, the Netherlands, and transfer its marketing network for the products to Atochem, which produces them in France. In return, ICI would acquire Atochem's French plant making specialty ethylene oxide derivatives, thereby extending the range of its own ethylene oxide and glycol operations in the U.K.

"Restructuring of the European monomers and commodity plastics industry has gone too slowly, however," says Simon de Bree, executive vice president for plastics at DSM of the Netherlands. Noting that his company has a strong position in the field, he states that "DSM is prepared to discuss cooperation with other producers and combine forces with them to contribute to the restructuring of the industry."

Ethylene overcapacity remains one of Western Europe's biggest problem areas. Despite plant closures in the past few years that cut annual output capability about 11% from almost 38 billion lb, the current 34 billion lb-per-year total is still well above this year's demand of some 26 billion lb. And 1984 is a good year. With a dip expected, it could be several years before production from European crackers moves back up to this year's level, Shell's Beauregard surmises.

One of the problems is that of the nearly 40 ethylene producers in Eu-

rope, more than half now rely on a single cracker. As Beauregard points out, closure of a producer's sole unit is the hardest step to take. Another problem is that national governments have a major stake in 13 of the companies that make the olefin throughout Europe.

Unless something drastic is done, the position will worsen next year with the startup of a 1.1 billion lb-per-year ethylene plant at Mossmorran, Scotland. Funded jointly by Esso and Shell, feedstock will be ethane extracted from the partners' North Sea oil fields.

The Mossmorran cracker will be the only one in Europe based on ethane. According to Esso and Shell, who individually operate crackers elsewhere in Europe, it will have important production economies compared to units that use liquid feedstocks, such as naphtha.

ICI, meanwhile, is waiting judgment on its legal action contesting tax concessions on the North Sea-derived ethane that the U.K. government granted to Esso and Shell. The tax break, ICI claims, will result in an unfair competitive edge that, it goes on to warn, could have serious consequences for its own ethylene-based petrochemical production at Wilton, England.

With the prospect of continuing competitive pressures on bulk chemicals, Europeans are stepping up their efforts to improve process efficiencies and cut energy use. They also are reducing their dependence on commodities by shifting to more profitable specialty areas.

Matt Steinbrüchel, director of planning at Dow Europe, for example, expects business to be split about 60/40 between specialties and commodities in three or four years, largely because of selective acquisitions and an ongoing diversification program. This will reverse Dow Europe's portfolio profile of a few years ago.

ICI chairman John Harvey-Jones observes that last year, bulk chemicals accounted for 55% of the company's sales but just 16% of profits. "In 1979, 60% of our sales and 40% of our profits were derived from cyclical businesses. We are moving more toward specialties and 'effect' chemicals while sustaining the best of our commodity businesses. You cannot make ICI totally recession-proof," he adds. "But we know where we are going, and, what is more, we are getting there."

Anil Parikh of Monsanto notes, "We began moving out of commodity plastics and fibers in Europe before most other companies. Between 1978 and 1983, there was only one year when we didn't divest something. Now we are focusing on growth. We are running a tighter ship with smaller sales, but we have a healthier bottom line."

Growth is foreseen for specialty plastics, elastomers, and the like. Typical of some high-priced specialties are the fluorinated chemicals and polymers of Du Pont and ICI and the cross-linked polyethylene and thermoplastic elastomers of Dow. At DSM, development is under way on a novel nylon 46 that promises to pose a challenge to nylon 6 and 66, as well as on superstrong polyethylene fiber for use in plastic composites.

Du Pont, ICI, and others in Europe, too, are bolstering their position in electronic chemicals and related fields. Du Pont, for instance, invested more than $30 million this year in Europe in a drive to bolster its position as a supplier of electronic materials and systems, and expects to continue to spend at a similar rate during the next year or so. Products made at its plants in France, West Germany, the Netherlands, and the U.K. include electrical connectors, thick film pastes, and dry film resists.

Noting such moves, Charles Doscher, president of Eni Chemical, the international arm of EniChem, cautions that chemical companies that try to move into specialties to meet the threat from low-cost Middle Eastern imports must guard against putting their established commodity businesses at risk. "European industry should not neglect its commodity plastics and chemical products or be guilty of neglecting its customers who depend on these products," he points out.

Doscher urges European producers "to recognize that bulk products still are the core of today's business. A big effort has to be made to ensure viability in commodities as well as specialties." This effort, he notes, will involve a further round of restructuring, production efficiency programs, and continuing investment to ensure a sustained flow of new types or grades of products. □

Slow economic growth keeps unemployment high

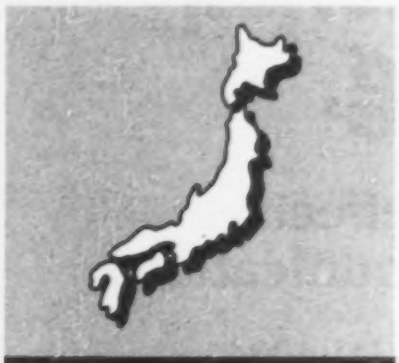
Business recovery throughout the European Economic Community became evident in last year's closing months and gained momentum as this year progressed. Gross domestic product (GDP) this year for the community is expected to advance about 2.2% from the 1983 level. A like gain is expected next year.

Though the GDP gain remains below 1979's 3.4% increase, the current upswing is a welcome change from 1982 and 1983 when the advance in each year was less than 1%. However, as the 1984 annual economic review of the Commission of the European Communities points out, "Growth rates (for this year and next) are too modest to result in a reduction of unemployment. The medium-term outlook for output and employment remains totally unsatisfactory."

Unemployment, a major problem for the 10 EEC member nations, has been rising during the past 20 years, and no end appears in sight. This year unemployment stands at about 11% of the workforce, up from last year's 10.6%. In 1985, it is expected to advance to 11.5%.

Unemployment rates vary. Belgium, Denmark, France, Ireland, Italy, the Netherlands, and the U.K. are highest, with double-digit rates, led by Ireland with 16.5%. West Germany and Greece have a comparatively moderate 8.5%, but the lowest level is in Luxembourg, with 1.7%.

The commission's review notes that much of present unemployment in the community may be attributed to the high labor costs and labor market rigidities. Examples cited of such rigidities are nonwage costs, minimum wage levels, rules governing recruitment and dismissal, and pension schemes.



JAPAN

Chemical business recovers, but good times may not last long

Chemical firms strive to overcome high costs and inefficiencies to maintain markets against foreign competitors

Earl V. Anderson, C&EN New York

Japanese chemical companies had been so low for so long that there was almost no other way to go but up. They certainly expected 1984 to be better than the past few years.

So far, based on their performance three quarters of the way through fiscal 1984 (which ends March 1985), they haven't been disappointed. In fact, most Japanese chemical companies are pleasantly surprised, because fiscal 1984 is turning out to be even better than expected.

For most important chemicals and plastics, production is up—in some cases significantly. Selling prices have firmed. Prices of raw materials, especially naphtha for the petrochemical industry, have eased.

This happy combination is reflected in company earnings statements. One good indicator is the performance of the 10 top Japanese chemical companies. Their combined sales are likely to be up about 5 to 6% in this fiscal year. But their net income will surge about 60%.

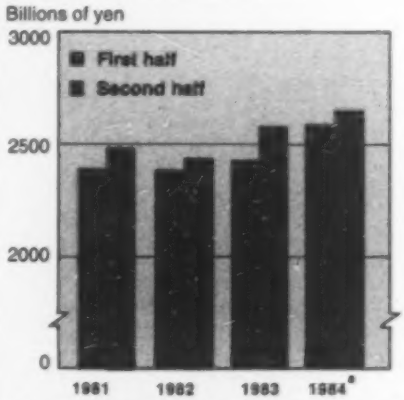
As a result, the combined profit margin (net income as a per cent of sales) of the 10 firms will improve to 1.5%. That may not sound like very much to, say, most U.S. chemical companies. But compared to the anemic 0.8% profit margin that the 10 companies reported, on average, during the previous four fiscal years, it seems lofty to them.

The euphoria may not last, however. Already there are signs that, in some product lines, chemical firms may have overproduced. Inventories are building ominously.

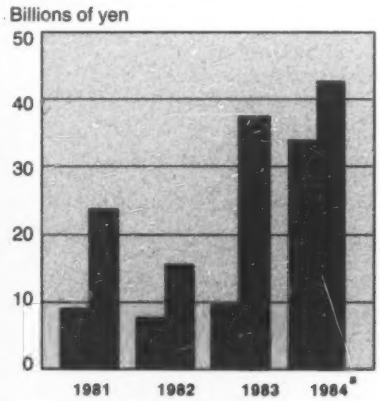
Ethylene and its derivatives are a good example. Despite a conscious effort to curb ethylene output and to scrap excess capacity, production took off this year. In calendar 1984, ethylene output probably will hit 4.1 million to 4.2 million metric tons, 12 to 14% higher than last year. This will be the first time that ethylene production has topped 4 million metric tons in Japan since 1980.

Business is better this year for Japanese chemical producers

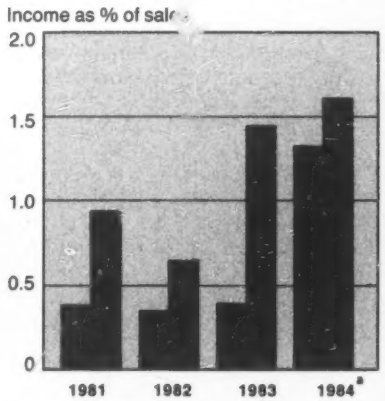
With sales up moderately . . .



earnings have snapped back . . .



. . . and profit margins are widening



a Estimated. **Note:** Data for fiscal years ending March 31. Based on results of 10 leading Japanese petrochemical companies: Mitsubishi Chemical Industries, Sumitomo Chemical, Asahi Chemical Industry, Toray Industries, Mitsui Toatsu Chemicals, Teijin, Showa Denko, Mitsubishi Petrochemical, Dainippon Ink & Chemicals, and Sekisui Chemical.
Source: Toyo Keizai Shinposha

Yasunobu Kishimoto, president of Showa Denko and chairman of the Japan Petrochemical Industry Association, concedes that ethylene output, especially late in the year, may be too high. He notes, too, that inventories of polyethylene and other major general-purpose resins have been increasing all along the chain from producer to final consumer.

There also is a good deal of concern about Japan's economy. That may seem ludicrous, since Japan's gross national product now is expected to increase 5.3% (after adjustment for inflation) in fiscal 1984, well above early estimates of 4.1%.

But the concern is genuine. Much of Japan's economic recovery has been led by export expansion. In the April–June period, the nation's Economic Planning Agency estimates that 44% of Japan's economic growth came from exports. Even the increase in capital investment at home was sustained by export-oriented industries. Japanese economists worry because personal consumption, the biggest component of domestic private demand, still appears dull.

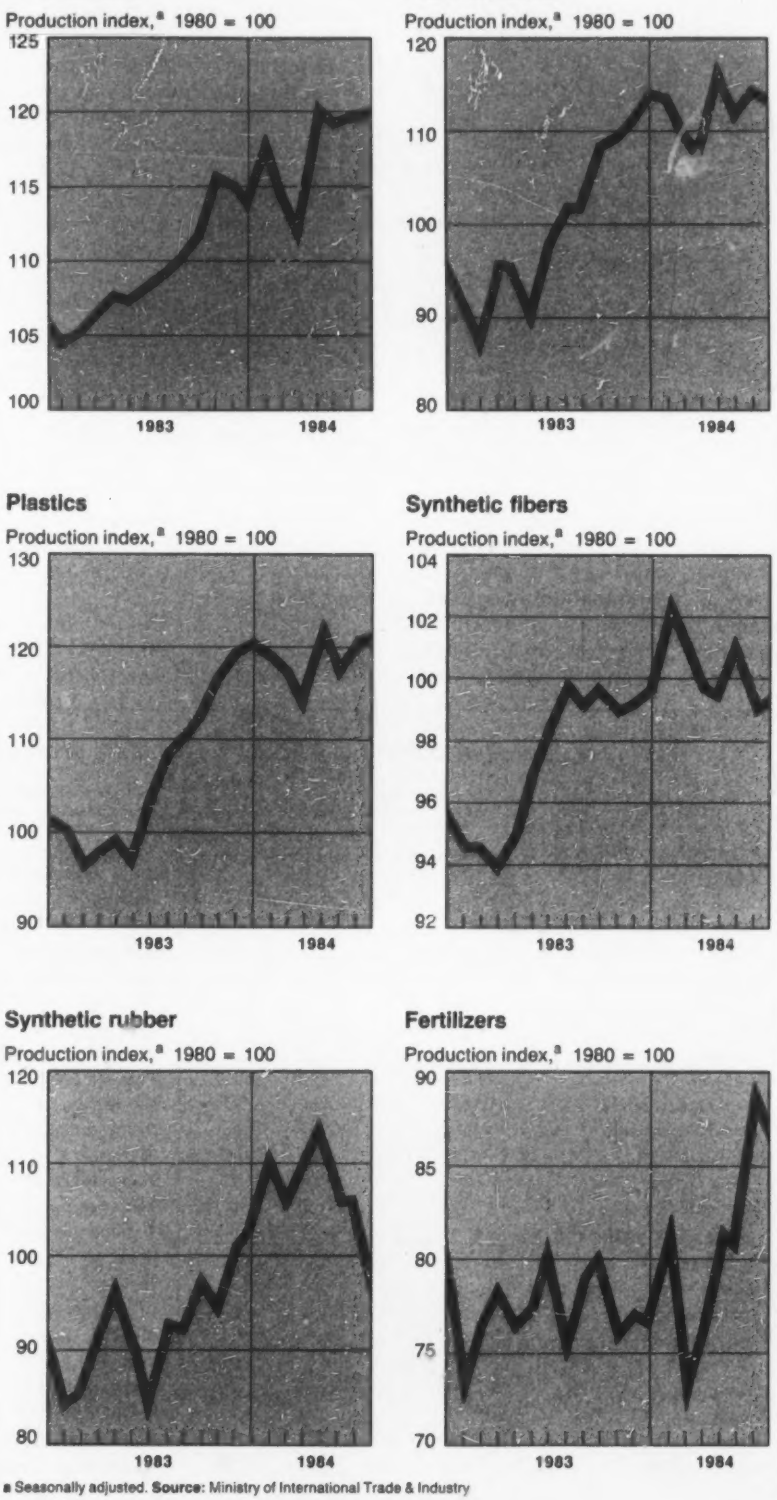
For Japan's chemical industry, both exports and domestic demand have increased. Still, there are reasons to doubt that it can look for lasting success in either sector.

Japanese chemical exports are likely to increase 12% this year to a record $7.8 billion. A good share of the industry's export success must be credited to the U.S. economy. With domestic demand strong, U.S. companies have eased up on their efforts to grab a larger share of the southeast Asian market, which figures strongly in Japanese chemical export plans. Of course, a strong U.S. dollar also makes it easier for Japanese companies to compete against the U.S.

However, even a record $7.8 billion in exports won't prevent the Japanese chemical trade deficit from increasing. Chemical imports probably will be up almost 17% to $8.4 billion, boosting last year's chemical trade deficit of $224 million up to about $600 million.

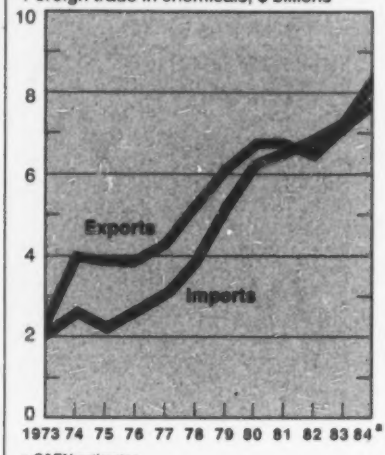
In a sense, exports even benefit Japanese chemical companies in their own domestic market. Much of their domestic demand comes from export-oriented industries such as auto and home appliances.

Chemical output this year is up from a year ago



a Seasonally adjusted. **Source:** Ministry of International Trade & Industry

Sharp rise in imports boosts chemical trade deficit



a C&EN estimates.
Source: Ministry of International Trade & Industry

The chemical companies may soon find both their own exports and those of their major domestic customers vulnerable. The country's economic leaders are concerned that growth has been too export-dependent and may take steps to change the situation. And Japan's political leaders are concerned about the country's embarrassingly high trade surplus and increasing complaints from major trading partners.

Meanwhile, chemical companies, particularly those heavily involved in petrochemicals, soon will be facing intense competition from new producers, such as Saudi Arabia, and from increased capacity in Canada. The impact will be felt in the all-important export markets of southeast Asia and at home as well.

If U.S. economic growth tapers off, as expected, Japan's chemical industry also can expect renewed competition from U.S. chemical exports. This will be especially true if the dollar weakens. Additional pressure from producers in Singapore and Taiwan will become apparent, too.

Meanwhile, a basic structural weakness of the petrochemical industry may spell trouble over the long haul.

Naphtha is still the primary petrochemical raw material, even though several companies are weaning themselves away from it in favor of liquefied natural gas. In addition, the industry is reducing its dependence on domestic naphtha in favor of less-expensive imported naphtha. But these moves won't make Japanese petrochemical producers competitive with natural gas-based producers.

In addition, the industry is populated with companies that often are small compared to most of their international counterparts. Many of them have small, old plants.

All of this adds up to inefficiency and no one recognizes this better than the industry's leaders. With the Ministry of International Trade & Industry's help, and under the protective umbrella of a structural reform law, many segments of the industry are trying to restructure themselves. And many companies are realigning themselves into a few producer and sales groups.

These moves will help. But can they help enough? Says Kishimoto succinctly, "We can no longer remain optimistic about the future of the petrochemical industry." □

Economic recovery spurs petrochemical and plastics production

Thousands of metric tons unless otherwise indicated	1983	Eight months 1984	Eight months 1983	% change
INORGANIC CHEMICALS				
Ammonium chloride	435	268	296	−9%
Ammonium sulfate	1722	1221	1136	7
Calcium carbide	476	330	319	3
Calcium superphosphate	559	363	371	−2
Carbon black	568	401	366	10
Chlorine, liquid	818	587	533	10
Hydrochloric acid	511	332	336	−1
Nitrogen[a]	5369	3386	3489	11
Oxygen[a]	6434	4736	4193	13
Sodium carbonate	1103	695	758	−8
Sodium hydroxide	2863	2019	1854	9
Sodium silicate	588	386	385	0
Sulfuric acid	6662	4270	4421	−3
Titanium dioxide	196	131	130	1
ORGANIC CHEMICALS				
Acetaldehyde	255	191	161	19
Acetic acid	328	224	204	10
Acetone	247	162	164	−1
Acrylonitrile	459	340	286	19
Benzene[b]	1750	1316	1111	18
Butadiene	556	411	355	16
Butanol	229	158	144	10
Caprolactam	395	288	262	10
Cyclohexane	454	332	310	7
Dioctyl phthalate	231	169	148	14
Ethylene	3688	2900	2286	27
Ethylene dichloride	1736	1290	1098	17
Ethylene glycol	357	274	221	24
Ethylene oxide	468	345	295	17
Methanol	373	181	267	−32
Octanol	219	159	134	19
Phenol	271	182	177	3
Phthalic anhydride[b]	161	106	109	−3
Propylene	2658	1918	1688	14
Propylene glycol	194	133	123	8
Styrene	1184	913	713	28
Terephthalic acid	702	486	473	3
Toluene	831	514	553	−7
Toluene diisocyanate	74	49	47	4
Urea	980	658	672	−2
Xylene	1264	919	864	6
PLASTICS				
Phenolic resins	303	217	194	12
Polyethylene	1773	1514	1084	40
Polypropylene	1062	816	685	19
Polystyrene	1311	979	818	20
Polyvinyl chloride	1420	993	898	11
SYNTHETIC RUBBER	1002	782	656	19

a Millions of cubic meters. b Petroleum-based product only. **Source:** Ministry of International Trade & Industry

CANADA

Rebound in chemicals may be grinding to an early halt

Exports have bolstered chemical output, but the industry remains concerned about high costs for feedstocks

Earl V. Anderson, C&EN New York

The welcome recovery that the Canadian chemical industry had been experiencing early this year may be running out of steam. Just as it appeared as if earnings were climbing back toward the heady levels of 1979, 1980, and early 1981, along came this year's third quarter, with generally lower sales and significantly lower earnings.

When they are finally compiled, this year's fourth-quarter results probably won't be anything to brag about either. And with ominous signs that the Canadian economy is slowing down, it may well be that the rebound will end before the industry really is fully recovered.

Admittedly, there is a lot of uncertainty about Canada's economic outlook next year. Opinions of respected economists range from no recession to deep recession. Much depends upon what happens in the U.S., particularly to interest rates.

But a likely scenario is that the Canadian economy next year will be flirting dangerously close to a recession, if it isn't already. Real growth in gross national product, if there is any, will be minimal—about 1 to 1.5%—compared to this year's 3.5 to 4%.

Even now, much of Canada's economic momentum is coming from exports to the U.S. This is especially true of chemicals. Canadian chemical exports will increase a tidy 23% this year to $5.35 billion (Canadian). A disproportionate 66% of those exports will go to the U.S.

The increase in exports has helped Canada slip back into a positive chemical trade balance this year of about $50 million, because imports are expected to rise 21% to $5.3 billion. That's a far cry from the $790 million surplus that the chemical industry racked up in 1981, but it is a lot more palatable than last year's deficit of nearly $50 million.

Chemical exports are a key reason why Canadian chemical firms have been able to increase production of many key chemicals this year. At the same time, several plants, geared primarily to the export market, have come on stream in Alberta.

Alberta Gas Ethylene launched its second world-scale ethylene plant at Joffre—a 680,000 metric-ton-per-year behemoth. Shell Canada opened its $1.4 billion synthetic crude oil refinery at Scotford. Included are a 300,000-metric-ton styrene plant and a 235,000-metric-ton benzene unit.

Meanwhile, Novacor has chipped in with a 270,000-metric-ton low-density polyethylene plant at Joffre. And Union Carbide Canada put on stream its huge 225,000-metric-ton ethylene glycol unit at Prentiss.

Not surprisingly, Canadian ethylene output has spurted this year to about 1.5 million metric tons, 22% higher than last year. Polyethylene (both low and high density) production will be up 16% to 720,000 metric tons.

Fertilizer has been another strong segment of the Canadian chemical industry. Production of ammonia

Output is up markedly this year for most chemicals

Thousands of metric tons	1984[a]	1983	1982	1981	1980	1979
Ammonia	3600	2888	2509	2654	2555	2405
Ammonium nitrate	990	934	1018	1212	873	914
Ammonium phosphate	1400	1259	888	1355	1466	1336
Benzene	580	580	504	571	604	492
Chlorine	1420	1385	1233	1292	1303	1031
Ethylene	1460	1196	1013	1330	1184	1014
Hydrochloric acid, 100%	165	170	135	186	177	154
Phosphoric acid, 100% P_2O_5	720	656	503	744	808	748
Polyethylene	720	623	571	633	641	628
Polyvinyl chloride	245	243	194	222	190	145
Propylene	680	715	618	671	590	na
Sodium chlorate	300	294	264	255	245	224
Sodium hydroxide	1470	1528	1367	1458	1459	1138
Sulfuric acid	4100	3686	3131	4117	4295	3666
Urea	2150	1445	1231	1303	1274	2121

a C&EN estimates. na = not available. Source: Statistics Canada

will increase 25% to 3.6 million metric tons this year. And urea output will be up a whopping 49% to 2.15 million metric tons.

These larger volumes, along with higher selling prices in some cases, helped Canadian chemical companies improve their sales and profit picture—at least through the first six months of the year. But in the third quarter, disturbing signs started to creep into earnings statements.

For Celanese Canada, third-quarter sales were $89.2 million, slightly lower than in last year's third quarter. More critical, though, the company lost $241,000 on those sales, its first quarterly loss in two years.

Celanese expected the usual seasonal decline in sales during the third quarter. But it says the decline was sharper than normal. In part, this was due to increased textile and apparel imports. The company anticipates a return to profitability during the fourth quarter.

Not all companies are optimistic about the fourth quarter, however. Du Pont Canada, for instance, had net earnings of $36.1 million for the first nine months, compared to $22.7 million last year. But company president J. Edward Newall says that fourth-quarter sales and earnings will be below "the excellent results achieved in 1983." The reason: continued weakness in fibers and more intense competition in many chemicals and plastics markets.

Union Carbide Canada, which lost $903,000 on sales of $176 million in the third quarter, attributes its lingering troubles to the petrochemical cost-price squeeze. The chief culprits, according to company chairman W. Norman Kissick, are noncompetitive Canadian petrochemical feedstock costs and increasingly depressed prices for petrochemical products, particularly for polyethylene.

Thus, the Canadian chemical industry seems to be on the verge of facing a new set of problems even before its old ones have been completely solved. There is no doubt that the industry has been badly wounded by Canada's National Energy Program. For some time, chemical leaders have been urging the government to ease the tax burdens that make its feedstock more expensive than that of other producers, particularly those on the U.S. Gulf Coast. But, despite some encouraging promises from the new Conservative federal government, salvation is far from guaranteed.

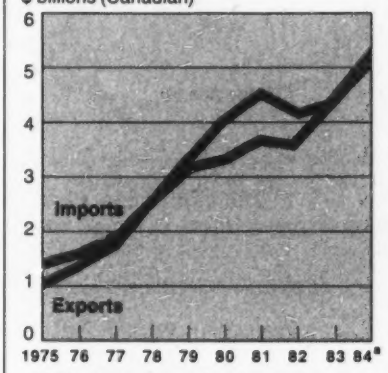
Now, Canadian chemical companies also must face the prospects of another economic slowdown before they have recovered fully from the last one. The U.S. economy already is slowing down and prospects for next year aren't very encouraging.

Those all-important Canadian chemical exports to the U.S. could feel the pinch. And if the world economy follows that of the U.S. into a slowdown, Canadian chemical exports would be in real trouble. A weaker economy at home will only add to the industry's problems.

Provincial governments already are pitching in to help their petrochemical industries. The Quebec government is pumping financial aid (along with some federal funds) into Petromont to keep the petrochemical industry alive in the Montreal area. And the Alberta government is subsidizing the price of natural gas until users and producers can arrive at market pricing arrangements. But the real answer lies in a favorable federal pricing policy for petrochemical feedstocks. □

Chemical trade balance regains a slim surplus

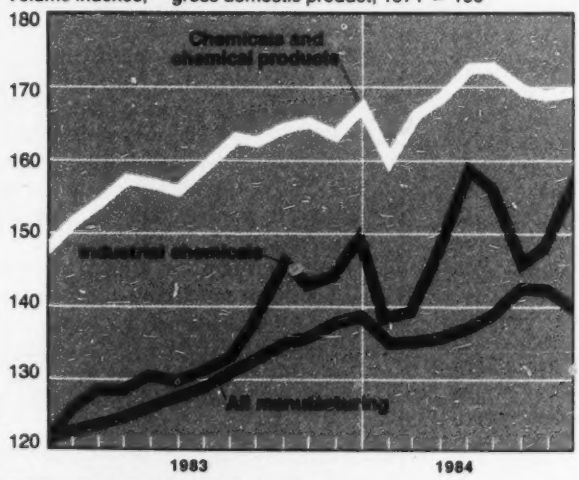
Foreign trade in chemicals, $ billions (Canadian)



a C&EN estimates. Source: Statistics Canada

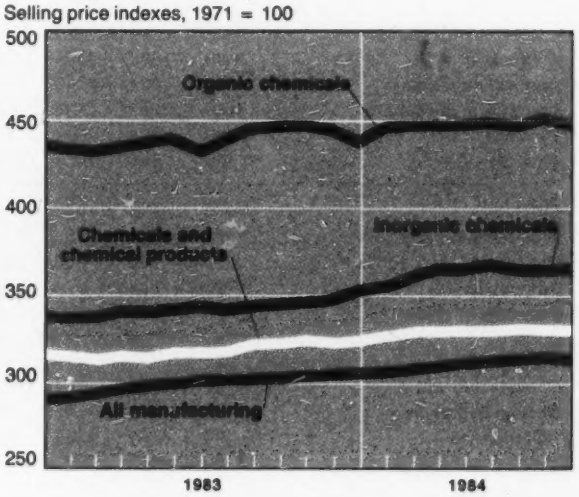
Recovery in chemical output slows . . .

Volume indexes,[a] gross domestic product, 1971 = 100



. . . as prices level out

Selling price indexes, 1971 = 100



a Seasonally adjusted. Source: Statistics Canada

U.S.S.R./ EASTERN EUROPE

Five-year plan goals beyond reach in Soviet Union and Eastern Europe

Soviet leaders criticize chemical, petrochemical, fertilizer industries for mismanagement, failure to meet targets

Richard J. Seltzer, C&EN Washington

The Soviet Union and its six East European allies—Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania—are completing the fourth year of their current five-year plans. Their economies and industry generally picked up in 1983 and 1984, after stagnating or even going backwards during the preceding three years. However, growth continues at a relatively slow pace, and even the modest goals of the current five-year plans seem generally beyond reach.

Gross national product (GNP) for the six East European nations (adjusted for inflation) rose 1.9% in 1983, compared to drops of 0.3%, 1.0%, and 0.8%, respectively, in 1980, 1981, and 1982, according to Central Intelligence Agency calculations. (CIA figures are generally lower than official Soviet statistics because of elimination of double counting and disguised inflation.) The goal was 3.2% for 1983, however.

Similarly, industrial output rose 2.8% in 1983, after zero growth in 1982 and a 2.0% drop in 1981, CIA estimates. (The target was 4% in 1983.)

Following the same trend, Soviet GNP grew 3.0% in 1983, below the goal of 3.3% but above growth of 0.2%, 1.7%, 2.1%, and 2.6% in 1979 to 1982. This year, the Soviets expect to achieve their 3% goal. In 1983, industrial output rose 3.7%, exceeding the goal of 3.2% and doubling the 2% growth of 1982. However, this is still far short of the annual growth rate of 4.7% for 1981–85 set by the five-year plan. Moreover, the goal is only 3.8% for 1984 and 3.9% for 1985.

Chemical and rubber output also rebounded in 1983 in most of the six nations, according to official figures. For example, Romania's output rose 6%, Bulgaria's 7%, and Czechoslovakia's 3%, compared to 1%, 6%, and 1%, respectively, in 1982. Countries of the region plan to increase the proportion of plastics, resins, fibers, pharmaceuticals, and cosmetics in their total chemical output.

Soviet chemical output was up 6% last year, slightly surpassing the target of 5.7% per year for 1981–85, after falling far short of it in 1981 and 1982. This year, through October, production is again up 6%, compared to the same period last year. Production of plastics leads the way with an 11% increase. In 1985, chemical and petrochemical industries are to raise output 5%, with fertilizers up 11%, pesticides and plastics up 9%, and caustic soda up 7%.

The Soviet chemical industry has received large investment only in recent years. Its rapid expansion has led to problems in absorbing foreign technology, completing new projects on schedule, and achieving the proper mix of products. Thus, there continue to be shortages of chemical products, such as plastics and fertilizers. Indeed, Soviet leaders recently criticized the Ministry for the Production of Mineral Fertilizers and the ministries of Chemical Industry, of Petroleum Refining & Petrochemical Industry, and of the Petroleum Industry for mismanagement and failure to meet targets.

Continued growth depends on the Soviets' overcoming such serious problems as slow growth in labor supply, greater difficulty in extracting raw materials and fuels, and the rigidity of central planning and state ownership. Soviet leaders tinker with the current system, instead of seeking structural changes that might threaten party control. However, this year they began an "economic experiment," giving enterprises run by five government ministries more autonomy. The program will be greatly expanded in 1985. □

Plastics lead rise in Soviet chemical production

Thousands of metric tons, unless otherwise noted	10 months 1984	1983	Change 1983–84[a]
Mineral fertilizers[b]	25,600	29,700	4%
Nitrogen (N)	na	13,050	na
Phosphate (P_2O_5)[c]	na	7,350	na
Potash (K_2O)	na	9,300	na
Sulfuric acid, 100%	20,900	24,700	3
Synthetic ammonia[d]	na	16,770	na
Plastics[e]	4,000	4,419	11
Sodium hydroxide, 100%	2,500	2,853	4
Synthetic rubber	na	1,810	na
Chemical fibers and yarns	1,200	1,400	5
Pesticides	481	557	3
Rubber tires (thousands of units)	53,100	62,000	3

a For January–October 1984 compared to same period in 1983. b Nutrient content basis. c Includes production of ground phosphate rock for direct application and phosphate animal feeds. d Nitrogen content basis. e Includes resins for man-made fibers. na = not available. **Sources:** U.S.S.R. Central Statistical Administration, United Nations Economic Commission for Europe (based on official national statistics), Central Intelligence Agency, Department of Agriculture

MIDDLE EAST

Impact of low-cost products could alter balance of global trade in basic chemicals

Dermot A. O'Sullivan, C&EN London

Richard J. Seltzer, C&EN Washington

Saudi petrochemicals are about to vie for world markets

Saudi Arabia continues to hold the spotlight in Middle East petrochemicals. Understandably, the prospect of a variety of products made there appearing on world markets as next year progresses is causing concern among established producers, who foresee their domestic and export markets coming under threat.

There's no denying that the capacities of new Saudi plants, in absolute terms, are significant. Two methanol units capable of making 2.75 billion lb a year total already are on stream. By this time next year, Saudi Arabia will have an annual output capability of 829 million lb of caustic soda, 618 million lb of ethanol, 3.54 billion lb of ethylene, 1 billion lb of ethylene dichloride, 1.14 billion lb of ethylene glycol, 200 million lb of high-density polyethylene, 1.31 billion lb of linear low-density polyethylene, 440 million lb of polyvinyl chloride, 649 million lb of styrene, and 660 million lb of vinyl chloride.

Some of the output, made by Saudi Basic Industries Corp. (SABIC) and its joint-venture partners, will meet growing domestic and local regional demand. The bulk of production, however, will go to Europe, the Far East, and the U.S. Initially, upward to 75% of the marketing likely will be done through SABIC's partners.

SABIC executives insist that they intend to introduce their products in an orderly manner at competitive prices. By inference, this suggests that they are prepared to lower their prices to match any like move by established producers. They will have plenty of room to maneuver in view of their comparatively low production costs.

A detailed analysis compiled by De Witt & Co., Houston, highlights cost discrepancies among production of various petrochemicals in Saudi Arabia and elsewhere. In the case of ethylene, for instance, Saudi product derived from ethane can be made for about 12 cents a lb in contrast to about 20 cents in the U.S., 23 cents in Western Europe, and 25 cents in Japan. Likewise, the 26.7 cent-per-lb cost of polyethylene made in a 220 million lb-a-year unit compares to 40.6 cents in the U.S., 44.9 cents in Western Europe, and 48.8 cents in Japan.

Some observers argue that the large production quantities shouldn't be viewed in isolation. "The reality of the situation," states Mike Hyde, publisher of *Chemical Insight* in London, "is that Saudi Arabia will represent between 2.6 and 2.7% of total world demand of all petrochemicals and plastics. Even against the most pessimistic forecast, that represents no more than one year's growth."

Nevertheless, Tony Church, chemicals analyst at Kidder, Peabody's London office, believes that "Middle Eastern production, especially that in Saudi Arabia, together with output from other new areas, will have a major impact, changing the whole balance of global trade in basic chemicals. How much this fundamental change in the industry will affect the established producers will depend to a large extent on the reaction of those producers."

Meanwhile, Israel is completing its sixth straight year of triple-digit inflation (190% in 1983). It is also beset by labor unrest, low productivity, declining revenues, rising unemployment, sluggish exports, and diminishing foreign currency reserves. Drastic budget cuts and structural economic reforms are urged on the new government, but there is doubt it is capable of deciding on and implementing such a program.

One step in digging out of the economic crisis is to spur exports, especially from science-based industry. In 1983, Israel produced $2.9 billion in chemically related products, including $969 million from minerals and mining, $558 million in plastic and rubber products, $552 million in basic chemicals, $192 million in pesticides, and $189 million in pharmaceuticals. It exported 55% of its output of basic chemicals, 51% of pesticides, and 22% of pharmaceuticals. In 1983, it invested $161 million in chemicals (14% of all industrial investment), $123 million in mining and minerals (10%), and $52 million in plastics and rubber. And $150 million is to be invested in pesticide expansion.

Through last September, exports to the U.S. of chemicals, minerals, and plastics rose 56% (to $109 million). Israel hopes to magnify such exports under a free trade pact now being negotiated. However, U.S. bromine makers seek to exclude their products from the pact. □

BRAZIL

Petrochemical producers are seeking to build up domestic markets

Sharp rise in exports brings first chemical trade surplus, but future growth will rely more on sales at home

Earl V. Anderson, C&EN New York

Next year will be pivotal for Brazil's chemical industry, particularly its all-important petrochemical segment.

For some time now, the industry has been trying to compensate for a stagnant, even declining, domestic chemical market by emphasizing exports. It has been very successful, thanks to government help with export financing and raw material (naphtha) prices.

This year, the industry will achieve its first ever chemical trade surplus. Exports likely will increase a hefty 36% from 1983 to $1.8 billion, and imports, held in check by government controls, will inch up only 5% to $1.7 billion.

The resulting $85 million trade surplus might not sound like much, but considering that the country's chemical industry had a $2.6 billion trade deficit only four years ago, it is quite an accomplishment.

Next year, however, Brazil's chemical industry may not be able to rely so heavily on exports to keep its plants running at reasonable operating rates. This is especially true for basic petrochemicals and thermoplastics. The reason, of course, is the long-anticipated debut of petrochemicals from Saudi Arabia on world markets—in many cases the same markets that Brazilian companies covet. But Brazilian companies know they can't compete with Saudi Arabia's feedstock price advantage.

As a result, chemical industry leaders say they will have to start doing next year what they knew they would eventually have to do anyway—rely more on the domestic market for future growth. That prospect leaves many of them understandably nervous.

Now in its fourth year of recession, the Brazilian economy offers little cause for optimism. The country's huge external debt requires domestic belt tightening. Upcoming elections add to the uncertainty.

Despite all this, there are signs that Brazil's economy is starting to stir this year and will grow next year. Some Brazilian economists estimate that gross domestic product will increase 4 to 6% in 1985.

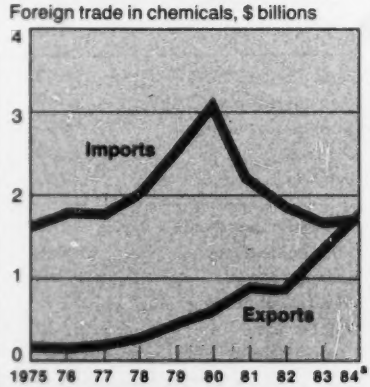
If it does, the petrochemical industry should benefit. This year, only an estimated 60% of production goes to domestic consumption; the remainder is exported. Next year, says Michel Hartveld, director of the Unipar Group, the domestic market's share of output may increase to 66%. Overall, petrochemical production is likely to increase about 10%.

How much headway the chemical industry actually makes in its own home market next year remains to be seen. Gaining ground certainly won't be easy. Rubens Gomes, executive secretary of ABIQUIM (Associação Brasileira da Indústria Química e de Produtos Derivados), the industry's trade association, notes, for instance, that during the past few years, with petrochemical prices rising and unemployment in Brazil running rampant, Brazilians turned from detergents back to soap. Reversing that trend now, even with an improved economy, will be difficult, says Gomes, and it will take time. The same thing has happened to some plastic products, particularly in packaging.

Obviously, exports must remain an important part of the industry's marketing picture for some time. However, like many producers that will have to contend with intense Saudi competition in world petrochemical markets, Brazil's companies are starting to stress the need to export more downstream products. Says one chemical executive, "We have to export more fabricated plastics items, not just the resins." □

Brazil barely gets its first chemical trade surplus

Foreign trade in chemicals, $ billions



a C&EN estimate. **Sources:** Carteira de Comercio Exterior, Banco do Brasil

CHINA

Sweeping economic reforms are aimed at quadrupling production

Output of many chemicals already has surpassed five-year plan targets, two years ahead of schedule

Richard J. Seltzer, C&EN Washington

In October, China unveiled what one observer calls "perhaps the boldest experiment ever attempted by a major communist country." Departing from the Soviet development model it has followed since 1949, China plans to curtail central economic planning, give greater autonomy to state-run enterprises, rely more on market forces to determine output and prices, establish incentives for workers, and expand the role of private entrepreneurs.

These sweeping changes accelerate reforms begun in 1979 under China's "economic readjustment" policy. China's program of adjustment and reform is part of an effort to quadruple industrial and agricultural output by the year 2000, putting China among world leaders.

China's strategic planning sets two stages of development, each a decade long. The first covers its sixth (1981–85) and seventh (1986–90) five-year plans. Readjustment and restructuring will continue in 1986–90, but emphasis will shift to large-scale technical transformation of existing enterprises and reform of economic management.

Results so far are on or ahead of target in many areas. For instance, total agricultural and industrial production grew 9% a year in 1981–83, versus the moderate target of 4% per year for 1981–85. Industrial output rose 7% a year (the target was 4%). Through October this year, industrial output soared 13% compared to the same period last year.

The chemical industry has one of the highest growth rates of any Chinese industry, paced by large infusions of foreign technology and equipment. Fertilizer output rose 4% a year in 1981–83, compared to a target of 2% a year for 1981–85. Indeed, in 1983, two years ahead of schedule, many chemicals surpassed their five-year-plan targets, including ammonia, fertilizer, sulfuric acid, sodium hydroxide, plastics, and pharmaceuticals.

Despite its achievements, China still faces major obstacles to economic development, including energy shortages, transportation bottlenecks, lack of raw materials, and bloated investment spending. Capital investment under the current five-year plan gives top priority to energy (26% of the funds) and transportation and telecommunications (13%). Chemicals (5%) also receive priority, with additions to capacity planned for urea (2.2 million metric tons), ammonia (1.5 million metric tons), man-made fibers (380,000 metric tons), sodium carbonate (260,000 metric tons), and ethylene (115,000 metric tons). □

Output of some chemicals already exceeds 1985 targets

Thousands of metric tons, unless otherwise noted	Target 1985	10 months 1984	1983	1982	1981	Change 1983–84[a]
Ammonia	15,800	na	16,760	15,463	14,833	na
Fertilizers[b]	13,400	12,453	13,789	12,781	12,390	6%
Nitrogen (N)	10,550	na	11,094	10,219	9,857	na
Phosphate (P_2O_5)[c]	2,800	na	2,666	2,537	2,508	na
Potash (K_2O)	50	na	29	26	25	na
Sulfuric acid, 100%	8,100	6,959	8,700	8,175	7,807	−3
Sodium hydroxide, 100%	2,100	1,847	2,123	2,073	1,923	4
Sodium carbonate	1,900	1,566	1,793	1,735	1,652	5
Plastics	1,050	na	1,121	1,003	916	na
Ethylene	700	526	650	565	505	−1
Synthetic detergents	na	na	677	569	478	na
Man-made fibers	780	588	541	517	527	34
Insecticides	na	280	331	457	484	−6
Pharmaceuticals	47	47	48	42	37	12
Rubber tires (thousands of units)	8,500	13,147	12,710	8,640	7,290	24

a For January–October 1984 compared to same period in 1983. b Nutrient content basis. c Including production of ground phosphate rock for direct application and phosphate animal feeds. na = not available. **Sources:** State Statistical Bureau of the People's Republic of China, Department of Commerce, Central Intelligence Agency